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PHYSICIANS' HALL.

1st October 1857

The Edinburgh Monthly Med. J.
With the Authors' Long

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BY

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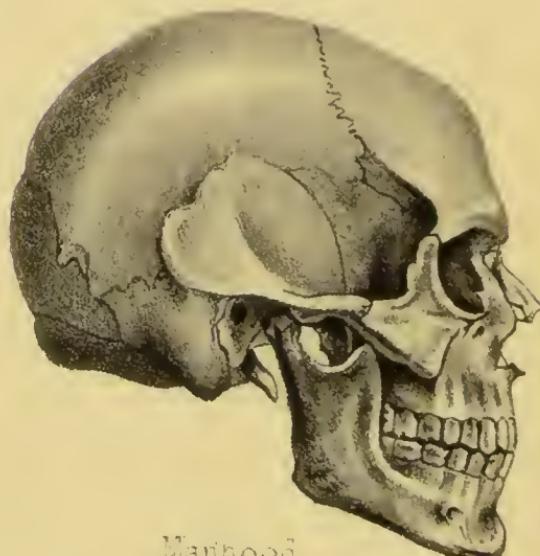
THE TEETH
AND
THEIR PRESERVATION.

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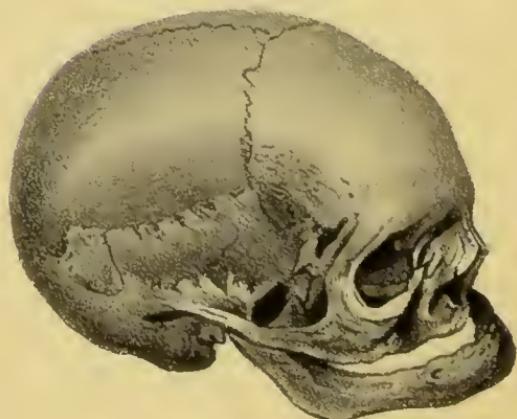
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Infancy



Maturity



Old age

THE TEETH AND THEIR PRESERVATION,

18

INFANCY AND MANHOOD, TO OLD AGE.

BY ALFRED CANTON, M.R.C.S.L.

DENTAL SURGEON TO CHARING CROSS HOSPITAL.

LONDON :
HIPPOLYTE BAILLIERE, 219, REGENT STREET,
AND 290, BROADWAY, NEW YORK, U.S.
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TO

HENRY HANCOCK, ESQ.,

FELLOW OF THE ROYAL COLLEGE OF SURGEONS,
LECTURER ON SURGERY AT THE CHARING CROSS HOSPITAL MEDICAL SCHOOL;
AND SURGEON TO THE CHARING CROSS HOSPITAL.,

THIS WORK IS DEDICATED,

AS A

TOKEN OF ESTEEM, GRATITUDE, AND FRIENDSHIP,

BY HIS OBLIGED HUMBLE SERVANT,

ALFRED CANTON,

SURGEON-DENTIST TO THE HOSPITAL.

P R E F A C E.



IN offering a new Work for the consideration of the public, it is usual to assign a reason for its publication. Were any wanting in the present instance, a paragraph which appeared recently in the *Times* newspaper, and which is duly noticed in its proper place, would afford a sufficient explanation for the appearance of a work intended to supply the non-professional portion of the public with information respecting the care, management, and preservation of the teeth. The paragraph alluded to was entitled, "The gold used by dentists," and it gave an account of some of the miseries endured by those who were unwise enough to place themselves in the hands of advertising *charlatans*, when requiring the assistance of art to replace their lost teeth, and to restore to them the power of mastication and proper articulation, together with the other comforts connected with the possession of teeth. The article in question, which evidently emanated from a dentist, who, in all

probability, had had a large experience of the evils caused by the quacks to whom I allude, gives a brief description of a few only of the diseases and injuries to health which are thus caused, and leaves altogether unnoticed another great evil, which many will think to be of no slight importance—the robberies constantly committed by pretenders to an art and science with which they are utterly unacquainted. The mischief which these men inflict is three-fold: under false pretences they rob those who are silly enough to confide in their promises and their assertions of skill and position, by heavy and enormous charges, totally unwarranted, and far beyond those which a respectable dentist would make for much superior work, and by the imposition of a partial or complete set of teeth, according to the exigencies of their unfortunate victims, which are totally unfit for the purpose for which they are avowedly designed. Our civil and criminal legal records will prove every statement here made. An advertisement is put forth, representing that artificial teeth, at a very low figure, can be obtained at — ; in the first instance a set is supplied at a comparatively moderate charge, but proving useless, another and more expensive set is furnished—expensive not only in their inutility and unfitness for adaptation to the mouth, and the purposes of mastication, but also in the charge made by the *soi-disant* dentist for them—these being equally unserviceable; if the unhappy wight thus taken in can still be deceived, a third set is furnished, differing only from the first

and second in being charged at a higher rate. In this manner, on more than one occasion, as every educated dentist can testify, persons have been mulcted to the amount of one hundred pounds, by applying to ignorant and presumptuous men for a set of teeth which, when obtained, are found to be wholly worthless; whereas, if application had been made in the first instance to really qualified and educated men, a good and useful set, such as would have relieved the wearers from many inconveniences, would have been prepared for one-fourth that sum, or but little more.

The evils which are induced by quackery in the art of dentistry are so enormous, and in every way so injurious, that it is wonderful that the authorities have not yet applied some remedy to prevent uneducated pretenders from assuming a rank and station for which they are wholly disqualified, but which unfortunately enables them to deceive and delude the public, robbing them of health and money. Meanwhile, as knowledge is ever the foe to falsehood and impudent assumptions, the following pages have been written, with a view to impart to the public that information respecting the physiology and diseases of the teeth which will enable them to distinguish between the man who has studied, and really knows his profession, and the false and treacherous pretender.

It may be said that of late several works have issued from the press, "on the preservation of the teeth," and that no other could now be wanted. But these are

of too small a calibre, and contain too small an amount of real useful information to be taken into account. Their sole object evidently is to display a series of pretty wood engravings, while the principal, the most necessary intent, that of imparting useful knowledge to those who do not possess it, is lost sight of. Besides, this work was commenced in the autumn of last year, long before the publication of these *opuscula*, portions of it being written from time to time, during a few leisure moments snatched from the performance of the duties of an arduous profession—duties which do not end when the patient has been seen, attended to, and dismissed, but which continue long after in the practice of the mechanical labours which the true dentist, wishful to serve those who confide in him, should himself perform.

To adapt teeth properly, one of the most important, but not the only important, duties of the dentist, is a task which the impostor cannot perform, and the consequence is that he supplies work which would disgrace him, and bring the blush of shame to his face, were he not sheathed in impenetrable brass. The failures in this respect are very numerous, and unfortunately they tend to inspire persons with a belief that all dentists in this respect are equally incapable, and thus these fellows wrong not only those who consult them, but the respectable persons of the fraternity to which they profess to belong. They deprive those who place themselves in their hands of their health, and of their money, without rendering them an equivalent, and they injure the

educated practitioner, by depriving him of patients by whom he might otherwise be consulted, and by the disgrace they inflict on the art and science which they pretend to practise.

To remedy these evils in some degree, by imparting the requisite information to the public, is the object of the following pages, and the Author will indeed rejoice if he succeed in rescuing but one person from these insatiable *charlatans*.

In preparing the pages now submitted for the consideration of the public, novelty has not been so much the aim, as the accumulation of useful and real information on points interesting to non-professional persons, and necessary to be known by them. In addition then to the facts which his practice has enabled him to place on record, the Author has sought for others in the established standard works on dental surgery, thus endeavoring to support the position he has taken, and the opinions he has advanced, by the authority of men who have long been recognised guides to the surgeon-dentist. Upon the operations in dental surgery, he has not thought it necessary to dwell, as no descriptions, however detailed and clear, could impart such knowledge to the public as to enable them to perform them themselves ; nor would it be advisable to for them do so, as they would assuredly commit great injury in the attempt. General observations only have been made, therefore, on those matters, sufficient, it is hoped, to guide the sufferer rightly in estimating the means adopted for his relief. The en-

gravings have been selected from the works of Owen, Quain, Tomes, and others, and are, it is hoped, calculated to assist the reader in understanding the subjects they are intended to illustrate.

ALFRED CANTON.

18, OLD BOND STREET,

MAY, 1851.

THE TEETH AND THEIR PRESERVATION.

CHAPTER I.

INTRODUCTORY REMARKS.

A GENERAL knowledge of the physiology and diseases of the teeth, and of the means by which the latter may be prevented or cured, more especially with respect to the progress of the first dentition, is of such evident importance to the public, that it cannot but be a source of wonder to find such extensive ignorance prevailing regarding it. That in infancy, when the gums are red, swollen and inflamed, the child fretful, feverish and restless, with great thirst and evident signs of disorder, either of the head, bowels, or skin, it becomes necessary to seek for medical assistance, and above all things, to have the gums freely lanced, so as to remove, as fully as possible, the impediments to the passage of the forthcoming tooth, is a fact well known to mothers and nurses, though unfortunately it is fre-

quently not acted upon from peculiar prejudices. As the child becomes older, all that is done for its teeth, is to have those extracted which, being carious, have become painful, or which require to be removed, because they prevent the eruption from the socket of the second, or permanent set. This unhappily constitutes too often all the care bestowed on the examination, protection, and preservation of the teeth of childhood—a period of life when, if possible, more watchfulness and attention are required than at any other, as the perusal of the following pages will, we trust, amply demonstrate.

It may appear strange that a Surgeon-Dentist, or Dental Surgeon, for the terms are synonymous, should seek to popularize some of the *arcana* of his science, by imparting information respecting the management and preservation of the teeth. A little consideration, however, will show the utility and propriety of the proceeding.

Parents who have enjoyed the advantages of a good education, who possess a well-cultivated intellect, and are guided in their actions by sound reason, will, when made aware of the physiological and pathological facts, to be detailed in the following pages, become more useful assistants to the dentist in charge of their children's teeth, will be enabled the sooner to detect the commencing ravages of disease, and will also be the more ready to seek for that professional assistance, by which alone the progress of decay can be arrested, and the annoyances caused by malformation or irregular growth and position of the teeth and jaws obviated and remedied. An affectionate mother, when made

aware how important for the preservation of health the teeth are—those portals to the apparatus of digestion—will watch carefully for every sign of decay or irritation, being assured that if these be neglected, especially if the neglect be allowed to extend over a considerable period of time, much mischief will ensue, not merely to the teeth themselves and their containing apparatus—the jaws, but also to the general health, by the impairment of digestion, on a due performance of which the natural growth and perfection of the human frame essentially depend. Neither do the consequences of such neglect end here ; by the loss, from decay or other causes, of the first or temporary set of teeth, prior to the time appointed by nature for them to be shed, the jaws lose more or less the peculiar shape belonging to them, their growth and progressive enlargement are impeded, the permanent teeth are injured, and the beautiful contour of the countenance, which depends greatly on the shape and size of the jaws, is proportionally impaired, and even lost.

Impelled by these considerations, the author has been induced to pen the following pages, in order to impart to the non-professional members of society for their guidance, some practical remarks on the teeth, their management and preservation, in infancy and childhood, during the adult period of life, even up to extreme old age. That there have been already published many very valuable works on the diseases of the teeth and their treatment, he is ready to admit, but they are addressed, for the most part, to the profession, and not to the general reader, being written in so technical a manner, and the descriptions they contain

being so elaborate, that professional men alone can comprehend them. They are, in consequence, altogether sealed to the public. The author is aware that books professedly written with a view to communicate information respecting any branch of the healing art to the non-medical portion of the community are looked upon by the profession with distrust, as bearing more or less upon quackery; but this charge, he trusts, will hardly be held applicable to his *opusculum*, for the reasons already stated; and he hopes that an attempt to render into familiar language that which is technical, so that it may be easily understood, to elucidate that which is obscure, and to communicate that amount of knowledge which should be possessed by every parent respecting the processes of nature in dentition, may be looked upon as it is intended—as a guide to the relatives of the little sufferers, to enable them to recognise the signs of approaching disease, and to know when to apply for that assistance which alone can prevent the occurrence of permanent, and often irremediable injury.

The importance of correct information on this point being possessed by the public at large, will be made evident by searching the records published by the Registrar-General. According to his report—and its accuracy is altogether undoubted—during the last five years there have died in London no less than 3466 infants from teething, and the disorders caused by the general irritation attending dentition: the total number of deaths from all causes being 258,271; giving the large proportion of one death from teething to seventy-four from all causes.

The remarks made by Mr. Graham, an American

author of some repute, with reference to the advantages to be derived from imparting a certain amount of medical knowledge to the non-professional portion of the public, apply equally, and perhaps more forcibly, to the science of dental surgery; inasmuch as the health and welfare of children, who have no means of protecting themselves, are concerned. Mr. Graham, in his "Lectures on the Science of Human Life," observes: "It is certain, that without a well-educated medical profession, of high moral tone, society cannot prosper; and it is equally certain that such a profession will be most accurately estimated where society is most intelligent in regard to the proper qualifications of such a profession; and therefore the most certain means of destroying every species of medical empiricism and imposture, and of securing the highest confidence in a responsible profession, is to enlighten the people in the knowledge of the laws of life and health."

The diseases which are induced in children by the passage, or eruption of the teeth in the process of the early dentition, are numerous, severe, and not unfrequently fatal. Convulsions, one of the most frequent causes of the mortality of children, owe their origin more generally to dentition than to any other cause. Water on the brain is often dependent, in the first instance, on the irritation set up in the system by the teeth, in their progress through the gums, while fever, general disorder of the health, eruptions of the skin, and disordered bowels, in other children, attest the influence of this powerfully disturbing cause. Palsy, affecting more or less the upper or the lower extremities, or both at once, has occasionally been induced as a

sequence of the irritation of dentition, and a general disturbance of the nervous system, particularly of that part called the cerebro-spinal axis, involving disorder of the brain and spinal marrow, may also be thus set up. These diseases are generally of considerable duration; their symptoms are exceedingly anomalous, and their causes often difficult to discover. That they are sometimes dependent on the disordered conditions which follow the irritation of dentition, no one acquainted with pathology will venture to deny. The great sympathetic connection between the teeth and the other organs of the body thus manifested in early life, is maintained through childhood, and shows itself occasionally in various ways during the period of adult existence. A patient complains of severe, unremitting pain in one or more teeth; on careful examination by the dentist, whose aid is frequently sought in such cases for the extraction of the supposed offender, the tooth, or teeth, is or are found to be perfectly sound, and if the dentist be a man possessed of general professional knowledge, and acquainted, as he should be, with the anatomy and physiology of the whole human system, he will be able to trace the pains complained of to irritation, or disorder of some other organ of the body, and thus to ascertain that the sufferings, as regards the teeth, are purely sympathetic, are not curable by the extraction of the teeth which are the apparent seat of the pain, but solely by directing the attention to, and removing the diseases by which the sympathetic irritation is induced. The converse of this proposition is equally valid, for cases occur in which sympathetic pains are complained of, situate in organs more or less remote

from the mouth, but which are solely caused by the extension of caries, or decay, in one or more teeth, the diseased tooth itself being very little, if at all painful, and not at all suspected by the patient as the cause of his sufferings. Numerous illustrations of this important fact might be adduced: inflammation of the eye and ear, and *tic douleuroux* (neuralgia of the face), are among the most common sympathetic disorders, induced by the progress of caries in a tooth. Inflammation of the ear is often induced by the irritation caused by the decay of a wisdom-tooth, and neuralgia resulting from a diseased tooth, has not unfrequently tormented the sufferer for years before its cause was detected. Again, the continued presence of decay in the teeth may induce permanent and severe disease in the adjoining parts, or structures, the irritation spreading from the tooth to the socket, lighting up inflammation of the membrane which lines it, and terminating in suppuration, or the formation of matter, which, to make its way to the surface, sets up decay in the jaw itself, pierces through it, and, forming a tumour between the bone and the gum, constitutes what is called a gum-boil. Disease in the antrum (the large cavity, the bony walls of which give shape and support to the cheeks,) may also be brought on by the continued irritation resulting from the decay of one or more teeth.

Although in aged persons, who have lost all, or the greater number of their teeth, the working, or motion of the jaws is tolerably free, and frequently repeated in the act of mastication; yet, in consequence of the loss of those important servants—the teeth—the food is not sufficiently reduced and disintegrated; nor does the

proper admixture, and, as it were, incorporation of the saliva with it take place. This incorporation is a necessary element in the digestive process, and its non-occurrence, combined with the imperfect mastication of the food, lead to, and induce attacks of indigestion and other disordered conditions of the alimentary canal. Constipation and obstruction of the loaded bowels may be thus caused, and may recur from time to time, each successive attack leaving behind it a greater tendency to sluggishness of the bowels, and consequently leading to a more speedy repetition of the attack, which may ultimately prove fatal. The only means for remedying this unhappy state of things, is the supplying a set of artificial teeth, by the aid of the mechanical dentist. With their assistance the edentulate old man, giving proper time to the due mastication of his nutriment, and employing the other necessary measures required by the state of health into which he has fallen, may, and will find himself, sooner or later, gradually restored to the fair average of vigour proper to his period of life.

One of the most prominent objects in the following pages, will be to impress on the minds of mothers, and of those having the superintendence of children, the important fact, which cannot be too well known and attended to, that, on their treatment of them during infancy, will depend, in many respects, the future health, strength, and happiness of the adult. This which, as a general rule, applies to the whole human frame, has not the less bearing on the particular subject of the present remarks, although persons are but too apt to overlook the fact that the teeth, in their growth, strength, shape,

action, and diseases, partake of the peculiar constitution of the individual to whom they belong. A knowledge of this fact must bring with it a conviction of the necessity of careful attention to them in early life, and that the neglect of the requisite precautions to be adopted will ensure much annoyance and suffering, both locally and generally, to the future man.

Medical writers have found a frequent and fertile theme for their comments, when referring to the serious injuries inflicted on the constitution by the mismanagement of infancy. An equal amount of injury may be effected by neglect and mismanagement of the teeth in early life; this will be readily conceded, if they be carefully examined under such circumstances. The changes they have undergone, the alterations in shape and position that have occurred, and the decay to which they become subject, clearly show the nature of the mischief that has been in progress; while, on the other hand, their state of imperfection reacts on the system, and becomes the means of seriously deranging those other important structures, the functions of which are more or less intimately connected with digestion. Nor is this all; for, as another and a natural consequence of such neglect, the personal appearance, so far, at least, as the features are concerned, is deteriorated, and the articulation seriously impeded.

Notwithstanding that of late years the knowledge of the structure and physiology of the teeth has been greatly extended, it must be admitted that there is much yet remaining in obscurity on these points, and much yet to be made known respecting the diseases which affect them, their nature, and the causes which

lead to their so frequent occurrence. The general reader will be better enabled to appreciate the services of the dental surgeon, and to understand how far they can be made available in preventing diseases, and removing their consequences, when all the facts at present known respecting these subjects have been fully explained. It is the more necessary that such information should be imparted to him, as there is perhaps no subject upon which unprofessional persons so readily deliver an opinion as that of dental surgery, in respect to the regulation, means of preservation, cure of the diseases, and the general management of the teeth; but there is withal little real information possessed by the public on these points, and the dentist has too frequently opportunities of witnessing the unfortunate results of misguided judgment, in the condition of the teeth of his patients, not to be deeply impressed with the truthfulness of the observation. How often do we see the effects of inattention and ignorance in the irregular rows of teeth which a child's mouth presents—irregularities which are, at last, submitted to the dentist to rectify, and often at a time when the opportunity of making his services available has passed away, and the mouth is stamped with irremediable deformity! Again, allow the progress of decay in the teeth to proceed without paying that attention to it which the necessity of the case requires, and the work of destruction becomes so far advanced, that the pulp cavity is encroached upon, is eventually opened into by the continued progress of the disease, and toothache sooner or later follows as a consequence. Much of the accruing mischief would have been remediable, had early application to the dentist been made.

The resources of his art, in respect to filing, removing the decayed part, &c., could, at an early period of the affection, have been put in requisition, with a very fair prospect of a successful issue, inasmuch as the admission of air, and the lodgment of food in the cavity would, by properly-adjusted stopping, have been prevented, and a tooth thereby preserved for, it may be, many years, which, on the other hand, had been allowed, through inattention, to be slowly but surely sacrificed. Many remarks have to be made in regard to decay and its remedies, which will, however, be considered hereafter.

Lastly, when the teeth have been lost, recourse to an artificial supply of them is not unfrequently neglected, in consequence of which an alteration of the voice may ensue; digestion, in its first process (mastication), is incompletely performed; and the visage prematurely acquires the aspect of age. All these effects will, of course, be more or less distinctly marked, in proportion to the greater or less number of teeth deficient.

And here we feel bound, though with extreme regret, to advert to the empiricism which is notoriously prevalent in the practice of dentistry. It is an invidious task to speak in terms of reprehension of any class of professional persons, under any circumstances whatever; but the duty becomes doubly painful when it devolves on one who, in its honest performance, exposes himself to the imputation of being actuated by interested motives. But no writer is entitled to shrink from the fulfilment of his duty to the public, on account of the possible annoyance or misrepresentation which its

faithful performance may bring upon himself; and we believe that every candid and impartial reader will go along with us in denouneing the unworthy charlatanism which at present, more than at any former period, dishonours our else honourable and useful profession.

“Quaekery,” indeed—to use onee more the popular and most significant term for ignorant empiricism—has found in no other branch of the healing art so wide and profitable a field as in dentistry: the delicate and difficult praetice of whieh is undertaken by a large and inereasing number of *soi-disant* “Dentists,” not only without the requisite physiologieal and surgiical qualifications, but even in many eases without the mere meehanieal knowledge of the dental art. For those legitimate modes, and that honourable emulation, by whieh respectable and edueated men seek advanement in their profession, these empiries substitute a system of gross imposture, supported by exaggerated and deceptive advertisements. These annonncements are so constantly before the publie eye, that we need not dwell on the infallible nostrums, the indestrnetible cements, the painless operations, &c., which their unscrupulous authours seek to palm on the publie. To edueated minds, such promises, so put forth, carry their own refntation. There is, however, one process, so commonly advertised by these irregular practitioners, so likely to impose on unprofessional persons, that we think it worth while briefly to indicate its fallaey in this place. We allude to the method of fixing artificial teeth, without the previous removal of the decayed stumps; this many advertising dentists profess to adopt as a general rule, but the qualified praetitioner

knows it must prove a certain source of pain and irritation in the great majority of cases, and that even in the rare and exceptional instances in which it is admissible, it is very difficult in execution, and very uncertain of result. The pressure of a foreign body, such as an artificial tooth, on a dead stump, must obviously act as a cause of inflammation, first to the socket, and ultimately even to the jaw itself; and though the regular dentist is sometimes obliged, in spite of his remonstrances and better judgment, to make this dangerous experiment at the instance of patients, misled into a fallacious reliance on its facility by the advertised pledges to which we have referred; yet the practitioner is, generally speaking, essentially wrong, and those who promise to use it in all cases, must be utterly ignorant of the first principles of the art, and unaware or regardless of the injuries they may inflict.

The dental surgeon is called upon not only to extract teeth—an important operation, requiring considerable anatomical knowledge, and great mechanical and surgical skill—but also to diagnose and treat the several diseases to which the teeth and jaws are subject, and to perform other operations, many of which are exceedingly delicate and important. He has, in fact, to exercise a distinct branch of surgery. To be enabled to perform his duties with credit and satisfaction to himself, and with benefit to his fellow-creatures, it is requisite that he should have received a peculiar education, specially adapted to the requirement of information directly bearing on all these points. That he should possess a full and accurate knowledge of the anatomy and physiology of the teeth, jaws, and mouth; in fact,

of all those parts of the body, the diseases of which he will be called upon to treat or prevent, must be at once self-evident to every one who thinks on the subject for a moment. For how can a man extract a tooth without risk of doing great mischief, unless he knows how it is imbedded in the socket, how many fangs it has, and in what directions they diverge ? But more than this is requisite. It has been already shown that many other organs of the body sympathise with the teeth ; that disease of the latter often causes sympathetic pain in other parts, and that disease affecting some other organ may manifest itself, as one of the symptoms at least, by pain or other annoyance in teeth which may be apparently sound. Disease too of a serious nature, affecting other parts more or less distant, may be caused by carious teeth, and again constitutional maladies may affect the teeth, requiring general measures and remedies for their cure. All these facts tend to show the necessity that exists for the dental surgeon, if he wish to do his duty honestly, and to be really serviceable in his sphere, to make himself acquainted with the general structure of the frame, and more especially with human physiology, and to study attentively those organs which principally sympathise with the teeth, and the signs by which those sympathies are manifested. In fact, a thorough knowledge of the anatomy of the teeth and jaws is indispensable to the well-informed dentist. Should he be ignorant on these points, how can he possibly understand, or successfully treat the diseases of these organs, when, like many others, they are liable to be affected by remote causes, having apparently no immediate connection with the effect produced ? For

instance, nothing is more common than a tendency to toothache during pregnancy—whence does this tendency arise?

This is a question that can only be answered by a person conversant with the sympathies of the nervous system.

Another important point connected with this subject bears directly on the education of the dentist. The mere mechanical man, whose education has not embraced a knowledge of the influence of the nerves by sympathy on different organs, if consulted by a female suffering from toothache during pregnancy, in all probability, if he found a carious tooth, would extract it, and thereby would incur the risk of causing a miscarriage, in that case certainly destroying one life—that of the infant, and also greatly endangering that of the mother. Again a patient applies to a dentist for relief from excruciating toothache; the tooth is examined, but is apparently sound, at least no cause can be detected to account for so serious an effect. The uneducated practitioner, in such a case, would either extract the tooth, thus unwarrantably depriving his patient of an useful servant, or would be puzzled to understand the case, and either use a *placebo*, or be compelled to call in other assistance, and thus tacitly make known his own want of professional information. The educated and experienced dentist, however, on the other hand, not finding any cause for pain in the tooth itself, would seek for it elsewhere, and ascertaining that the sufferings of his patient occurred periodically and regularly at a certain hour, would regard the case as

neuralgic, and as one requiring medical, and not surgical, treatment.

The education of the dental surgeon then should embrace a thorough acquaintance with the anatomy, physiology, and surgery of the teeth, jaws, and mouth, human and comparative; a general knowledge of the other structures of the body, a correct idea of the physiology of the human frame, and an intimate acquaintance with the nervous system, more especially of the nerves which are connected with those supplying the teeth and the organs of digestion, inasmuch as they influence the healthy and diseased sympathies of the system. Besides these, the dental surgeon should possess what is termed a mechanical turn of mind. There are very many things in dentistry which require the mechanical genius of the dentist to be displayed; and every practical man should be able, not only to take a cast of his patient's mouth, but to model and work the artificial teeth himself. He will thereby be better able to adapt the set accurately, will consequently give greater satisfaction, and the new apparatus will, from the first, cause less annoyance and uneasiness. He should also be well acquainted with the nature and composition of the substances used in the manufacture of artificial teeth; for which a certain amount of chemical acquirement will assuredly be requisite. The operations of stopping, filing, &c., are partly surgical and partly mechanical; and the dentist who does not combine a good knowledge of mechanics with his surgical information and tact, will not find himself so successful as one who does. So necessary is a knowledge of mechanics in

these matters, that many so-called dentists have started in practice with no other education in dentistry, they themselves having been previously the working assistants of a dentist, or perhaps watchmakers, surgical instrument makers, &c. After what has been said, it must be evident, that the surgeon-dentist, practising an important branch of medical science, must obtain a thoroughly scientific and professional education, in order that he may be fully prepared for all the exigencies and emergencies of life in which he may be called upon to act. Of late years, notwithstanding the large number of uneducated men who infest the profession, great improvements have been made, both as regards the scientific and the practical departments. The discoveries that have been made in the microscopic anatomy of the teeth, and their application to physiology, have, as a matter of course, emanated solely from men whose education has been very extended, and who have devoted a large portion of time, and great labour, to the investigation of the subjects under their consideration. Professor Owen, whose reputation is more than European, from his discoveries in comparative anatomy, has published a large work on "Odontography," which of itself would be sufficient to immortalise his name. The Nasmyths, Bell, Tomes, and some others, who have also been much occupied in microscopic and other investigations concerning the structure of the teeth, have added largely to the amount of information previously possessed by surgeon-dentists, and have shed real lustre on the profession of dental surgery. These gentlemen, with one exception, are legally qualified practitioners, in possession of the diploma in surgery granted by the Royal College of Surgeons in Lin-

coln's Inn Fields ; and fortunately for the honour and dignity of dentistry, no inconsiderable portion of those who now profess the art, have pursued the requisite studies to obtain that diploma, and have subsequently undergone the necessary examination. On one or two of the professors of dental science, the Council of the College, estimating their general and professional attainments as highly as they deserved, conferred the diploma of fellowship, under the Charter of 1843. Bell, Tomes, and Cartwright are entitled to add the honour-giving letters F.R.S. to their names, they having been elected Fellows of the Royal Society—a society of the highest repute in science throughout the civilized world. This will serve to show the estimation in which those are held who have regularly followed the required studies, and have duly availed themselves of the opportunities in their power to increase their own knowledge and advance science, and will prove the high rank dental science might take, if freed from the encumbrances of quackery and imposture, which at present overlay and deeply injure it in the eyes of the educated portion of the public.

It is not, however, by any means the intention of the writer to convey the impression that all the dental surgeons, unprovided with a medical diploma, are necessarily unacquainted with the science of their profession, and unable to appreciate and avail themselves of the discoveries made by the scientific and talented labourers of the present day : far from it ; there cannot be a doubt out that there are several, whose studies having been restricted to the dental art alone, have been of necessity deprived of the power to obtain a medical

or surgical diploma, but who are nevertheless eminently entitled to take their stand as educated and really qualified men in the profession they have chosen. To them, the remarks made respecting quackery and imposture do not apply. Unfortunately there are hundreds, however, to whom the strictures thus made are fully applicable; men whose sole object is to fleece the unwary, by the exercise of a profession, the requirements of which are far beyond them, but which offers many a chance to the rogue and empiric, for imposing on those who are unguarded enough to place themselves in their hands. Instances in which their imposition as been successful, their victims being frequently mulcted to a large amount, are unfortunately of constant occurrence.

To remedy or prevent these evils, and to ensure the respectability of the practising dentists, it has been seriously proposed that a college should be instituted, under a Royal Charter, which should have the power, after a careful scientific and practical examination, to grant licences to practise, and that, without such licence, no one should be permitted to follow the profession. There are, however, many objections to such a chartered institution, which could not be carried into operation without great difficulty, and which might lead to much professional discord and jealousy.

The education required for a man to become a good dental surgeon, is so nearly allied to that which is requisite for the surgeon, that no great hardship would be inflicted on the candidate for dental practice, were he required by an act of the legislature to become a member of a Royal College of Surgeons, prior to

entering into practice. He will meet in following his profession with so many occasions on which a general knowledge of the human frame in a state of health and disease, and of surgery, will be requisite and of infinite service, that he would never have cause to regret the extra labour and expense he had incurred ; while the possession of the diploma would stamp his position at once, and distinguish him from the horde of adventurers by whom the profession of dentistry is overrun. To elevate still more the position of the really qualified dental surgeon, to aid the progress of science, and to render the discoveries of the anatomist practically available, it would be advisable to establish a Society of Dental Surgeons, to which none should be admitted but those who are possessed of a legal qualification to practise, or who can show that they are really well-educated, qualified men, capable of serving the science they profess, and not in any way connected with the unprofessional practitioners of those who advertise in the newspapers. To effect this, its rules should be stringent, and duly enforced. Much good might be thus effected ; its meetings would be the means of disseminating much useful knowledge, while the library, which would doubtless be soon collected, would be of undoubted service to the members and to students. To render it still more practically available, a dispensary for the diseases of the teeth, and professorships of dental anatomy and surgery might be attached. Its funds might also be made available in supporting a journal of Dental Science, or in the publication of its proceedings, in the form of transactions.

Space cannot here be afforded to dwell on the ad-

vantages that would result from the adoption of this plan, but it would certainly be attended with numerous benefits, were it acted upon and fully carried out.

In Baltimore, in the United States, there has long been established a College of Dental Surgery, by which degrees in dentistry are granted, authorising their possessors to call themselves D.D.S., *i.e.* Doctors in Dental Surgery. The college has rooms appropriated for anatomical dissections and dental mechanism; and there is also an infirmary belonging to the institution. The professor of the principles and practice of dental surgery is Dr. Chapin Harris, the author of a large and useful work on the surgery of the teeth; special pathology and therapeutics are confided to Dr. Bond; Dr. Handy teaches anatomy and physiology; and Dr. Cone, operative and mechanical dentistry: the last is demonstrated by Dr. Austen. These subdivisions of the science of dental surgery, each taught by a different professor, show the importance attached by the transatlantic dentists to the attainment of a thorough knowledge of anatomy and physiology, as essential to the judicious practice of surgical and mechanical dentistry. The nature of the education stated in the preceding pages to be requisite for the surgeon-dentist, is fully understood and carried out in the United States; at least it is so in Baltimore.

It is probable that in one or more of the other portions of the United States, there are Colleges of Dental Surgery, granting degrees to those who pass successfully through the requisite examinations. There is at least one medical journal devoted to the consideration

of the dental art and science, but it is not at all well managed, nor in any way likely to further the progress of science. In London the principal medical schools have a professor of dental surgery, who in those institutions which are connected with hospitals, is generally also the hospital surgeon-dentist, and affords practical instruction to the students, as regards the diseases of the teeth, and their treatment.

Mechanical dentistry must, however, be acquired privately ; there are not any public schools in the profession, where the knowledge of mechanics specially required by the dental student can be obtained. This is to be regretted, as it often obliges the dentist to rely on the assistance of mere mechanics, who, after having worked for a longer or shorter period as assistants, not unfrequently start in practice, *trading* (the word is used advisedly) on the strength of their employer's name and reputation, and adding to the number of ignorant impostors, who disgrace the name of surgeon-dentist. This is one of the evils which the institution of a society of dental surgeons would tend to remedy.

Proceedings were commenced some few years since in Paris, before a magistrate, against certain dentists, who were practising as such without a diploma. They were fined 20f. each, with costs ; but one of them appealed to the Tribunal of Correctional Police against the decision. The sentence was, however, confirmed, the court declaring in its judgment, that every practising surgeon-dentist should possess the diploma of Doctor in Surgery, or that of Officer of Health, according to the law of the 19th Ventose, An. XI. That law

distinctly states that no one may exercise the art of medicine, surgery, or midwifery, unless he has previously undergone the requisite examinations, and obtained a diploma in proof thereof. The court held this law applicable to the case of the dentists, as practising a peculiar and special branch of surgery, just as it is applicable to oculists, and to all others, who devote themselves to the consideration and treatment of peculiar subdivisions of the art and science of surgery. The art of dentistry, the court said, evidently is part of the science of healing; it requires a certain amount of knowledge in medicine and surgery, more especially of the anatomy and pathology of the mouth; the treatment of the diseases of the teeth requires the use of medicines, some of which may be employed externally, and others internally, and more or less severe and important surgical operations are constantly performed by dentists. For all these reasons, the fine inflicted by the *Cour de Première Instance* was enforced, and the appellant was further condemned to pay the additional expenses.

It would be almost impossible to find another legal decision, which so fully sustains all the statements and arguments maintained in the preceding pages respecting the education and position of the surgeon-dentist. It is consequently much to be regretted that this just and proper decision was overruled on an appeal being made to the *Cour de Cassation*, and the fine remitted. A similar proceeding took place at Limoges, in 1827. Dentists in France at present, therefore, are in the same position as in these kingdoms; that is to say, they

are entitled to practise, without being required by law to possess any medical qualification. The profession and the public are equally interested in putting an end to this anomalous state of things, on both sides of the channel.

CHAPTER II.

THE PRESERVATION OF THE TEETH.

A GOOD set of teeth is valuable to its possessor, not merely as organs essential for the due performance of the mastication of the food, but it is also regarded as one of the principal ornaments of the features. Lord Chesterfield remarks, that “ fine and clean teeth are among the first recommendations to be met with in the common intercourse of society ;” and a writer in the French Dictionary of the Medieal Sciences, observes : “the teeth are the finest ornaments of the human countenance.” “ Their regularity and whiteness constitute its chief attraction. If the mouth exceeds its ordinary size, fine teeth serve to disguise this defect of conformation, and the illusion that results from the perfection of their arrangement is often such, that we imagine that it would not have appeared so well had it been smaller.” * * * * “ These ornaments are equally attractive in both sexes. They distinguish the elegant from the slovenly gentleman, and, by softening the

features, diffuse amiability over the whole countenance. Even the face of the black African, when he smilingly shows his white teeth, ceases to frighten the timid beauty.

“Fine teeth are more especially necessary to woman, for it is her destiny first to gratify our eyes, before she touches our souls, and captivates our hearts. The influence that the teeth exercise in the production of beauty, justifies the pre-eminence that I have assigned them over all the other attractions of the face. Let a woman have fine eyes, a pretty mouth, a handsome nose, a well-turned forehead, glossy hair, and a charming complexion, but only let her teeth be bad, blackened by caries, or covered with tartar, thick or viscid secretions,—let her, in a word, exhale a contaminated breath, and the moment she opens her mouth she will cease to be thought beautiful. If, on the contrary, she has small eyes, or a large nose, and is even positively ugly, yet, if her teeth are regular, white, and, above all, entire (at least those that are visible), she, however frightful she may be, will appear agreeable the moment a smile comes to her aid, and will hear those words whispered around her that are so consoling to her vanity: ‘Ah! what beautiful teeth she has!’ ”

Miss Strickland, in her “Lives of the Queens of England,” says: “Queen Elizabeth was a decided admirer of beauty, and entertained the greatest antipathy to ugly and deformed people; she even carried her fastidiousness on this point to such an extreme, that she refused the place of a gentleman usher to an unexceptionable person, for no other objection than the lack of one tooth!” Whilst these pages were passing

through the press, the newspapers record a singular and melancholy accident, by which death resulted indirectly through the loss of the front teeth. A middle-aged cottager, residing near Boston, in Lincolnshire, was much troubled with thread-worms, for relief from which he was in the habit of taking “opening pills,” which he purchased at a druggist’s in Boston. His articulation being greatly altered from the loss of the front teeth, on applying recently at a druggist’s—where he probably was not known, he was understood to ask for “opium” instead of “opening pills.” He was consequently supplied with the deadly drug, and the next day he was a corpse. The jury at the inquest returned a verdict of accidental death. Of such extreme importance may a loss become, by many regarded as almost trivial; and even life and death may depend on the more or less clear and intelligible pronunciation of words.

When Nature has failed to bestow her gifts on the teeth, and has made them defective in form, and tarnished in colour, great care and cleanliness should be used in order to hide these imperfections and faults; for in that case, if the teeth do not attract admiration, they will not inspire disgust. Regular, well-formed, white teeth, have been regarded as characteristics of beauty from all ages. The Hebrews considered their loss to be a grievous and serious misfortune. The Brahmins attach great importance to them, and even savage nations are very careful of their condition and preservation. By some of the latter—the natives of the Sandwich Islands, to wit,—the front teeth have been offered up as sacrifices to their gods.

Their value, as the organs by which mastication is performed, cannot be too highly estimated. In the preceding chapter, some of the injurious consequences which attend their loss in the edentulate old man, have been already pointed out. Much more might be said upon the subject, did space permit, but that must be deferred to another part of the work.

The mind of the dentist, when he contemplates the ravages of decay, which occur so early, and are so extensive in these little but most useful and ornamental organs, must frequently have had presented to it the question : How is it that the teeth, which are essential in mastication, and, consequently, to digestion, are cut with such difficulty, as frequently to endanger life, and even cause its loss, decay soon after they have been cut ; and become so frequent a source of pain and annoyance, leaving the unhappy patient, in his prime and vigour, without the means of crushing the food for which he labours ? How strange is it that they should give way at the very onset, and throw on the stomach a burden of duties additional to those which it has already to perform, thus laying the foundation for one of the greatest miseries to which human existence is subjected —indigestion, frequent attacks of which not seldom pave the way to more or less protracted hypochondriacism. It is not necessary to enter into an explicit account of the process of digestion to prove this. Every one is aware that, besides assisting in the articulation of words, the principal office of the teeth is to cut, tear, and bruise the food ; and if this be effectively performed, the saliva, during the process of mastication, becomes duly commingled with it ; and it is then, in

the form of a soft mass, propelled down the gullet into the stomach, where the process of digestion, properly so called, commences. This mass is acted upon by the proper juices of the stomach—the gastric juice ;—the stomach is set in motion, the food being turned over and over, so that every part of it is brought in contact with, and operated on by the gastric juice, by which it is changed into one homogeneous mass. This process is termed chymification, and the food is then in a condition fit to pass into the bowels, where it is further mingled with the bile, and other fluids, which also aid in adapting it for the sustenance of the frame, and rendering it fit to be absorbed into, and form part of the circulating fluid.

We need not pursue this subject further : it must be evident that if there be any break in the continuity of this complicated chain of actions and effects, that a considerable derangement of digestion must be the result, and, consequently, a disordered condition of the entire system, as the re-building up, the restoration and reparation of the human body depend on the due and healthy performance of the process of digestion. By it, when properly performed, good, healthy, reparative blood is generated, the body is sound and strong, its various functions are efficiently executed, the secretions are all healthy, the nervous energy is in full action, and the brain, duly stimulated and supported by healthy blood, is, with the intellect itself, in full vigour. On the other hand, all these arrangements are disturbed, if but one link in the chain be broken. If indigestion be caused and maintained but for a little while, the blood is vitiated, the functions of the body are interrupted,

the secretions become unhealthy, the nerves lose tone, the brain itself is disordered by the vitiated blood circulating through it, and the mind becomes impaired, as is manifested in various ways in dyspepsies, more especially in the form of hypocondriaism, while, to add to the annoyances already existing, the bowels become disordered by the passage through them of crude, undigested food, which necessarily becomes an additional source of irritation.

The duty of the stomach then is the digestion of the duly masticated food, and its reduction to chyme. If, however, from the loss of the teeth, or their decayed condition, the food is not properly masticated, and commingled with saliva, the stomach necessarily becomes oppressed ; it has a function thrust upon it which Nature never intended it to perform. The human stomach is not a gizzard to grind food into the state preparatory to digestion ; and whoever, either from loss of teeth, or from bolting his food, enforces that duty on it, must expect to suffer more or less in health in consequence. Such then constitute the advantages attendant on the possession of a good set of teeth ; they are necessary for mastication and digestion, and for the preservation of the health of the body and mind. They also, in no slight degree, constitute a principal ornament of the features. The disadvantages which follow their decay and loss are no less remarkable. It is not a mere loss of ornament, but an absolute disfigurement that follows : the countenance assumes the appearance of old age even in the prime of life, and the articulation is greatly impeded, and singularly altered. Repeated attacks of indigestion fol-

low : the mental powers are weakened in consequence of the alteration of the blood, the nervous system loses its energy, the secretions are vitiated, the bowels become disordered, reparation of the frame is wanting, and continued ill-health and suffering await the victim of decayed and lost teeth.

How are these advantages to be secured, and these acknowledged evils to be avoided ? A satisfactory reply to this question involves the consideration of certain physiological processes connected with the structure, formation, growth, and first appearance of the teeth ; it is desirable, therefore, that the reader should be made acquainted with the subjoined details, in order that he may be enabled to judge for himself of the truth of these deductions.

However much human teeth may differ in their form and in the number of their fangs, they are always, in the healthy state, composed of three distinct hard tissues, called respectively dentine or tooth substance, enamel, and cementum or true bone. They also contain a fluid, and a vascular pulp, the latter being enclosed within the cavity formed by the dense structures of the tooth. Of the solid tissues, each is more highly organised than the other. They are composed chiefly of salts of lime and animal matters, by the combination of which we have an exceedingly strong and resisting substance, admirably adapted for the purposes for which it is required.

Dentine constitutes the principal part of a tooth ; it gives it its peculiar shape, insomuch that if the enamel and cement were to be removed from it, the form and size would remain very nearly the same, the greatest

change being met with at the extremities of the tooth. This substance is very firm and dense in appearance ; and when broken, it presents a beautiful satin-like fracture, due to its peculiar structure, and to the refraction of the rays of light. Hard and resisting as it is, however, the microscope has revealed that it consists of tubes, or canals, and an intertubular tissue, the latter uniting the tubes together. These commence on the walls of the pulp cavity, of which each forms a part, and thence undulate to the surface, forming in their course several curves, and giving off branches, which unite together, and form frequent connections throughout the entire substance of the tooth. Each canal has its own proper walls, which are about equal in thickness to the diameter of their bores. The spaces between these canals are clearly perceptible by the aid of the microscope, but they lie much nearer each other in some parts of the tooth than in others. At their commencement, for instance, they are more closely packed together than they are at the surface, as they diverge from each other in their course, and become more and more separated as they approach it. Their course is in every tooth directed in such a manner as to ensure resistance to pressure or injury ; and a constant communication is kept up between them by means of their inter-connecting branches.

That these were really canals or tubes was doubted for a long time, and they were regarded as fibres only. The late Mr. Nasmyth was one of those who entertained this opinion ; but that they are really canals has been demonstrated by the use of the microscope, by means of which fluids have been seen to enter them, and

bubbles of gas to pass through them. Besides which, when sections of a tooth have been placed in the field of the microscope, the cut extremities of the canal have been distinctly visible.

In the crowns of teeth, cells are occasionally found in the dentine. These may be looked upon as evidences of deficiency of formation; in good sound teeth they are of rare occurrence; in those which are imperfectly developed, they are numerous and irregular. On its external coronal surface, we find small hexagonal depressions to receive the enamel. In the corresponding portion of the pulp cavity, open the mouths of numbers of these tubes. These canals are supposed to be filled with the serum of the blood; the dentine has not any vessels of its own, in which blood circulates; but it is nourished and supported by the blood serum. During an attack of cholera, however, and in cases of death by suffocation from drowning, hanging, or any other cause, it becomes of a pink colour, owing to the fluid its tubes contain having some broken and disorganised blood-globules dispersed, and held in suspension in it. A similar change to a deep yellow colour occurs sometimes in jaundice. This fluid, which circulates in the dentinal tubes, is exuded or poured forth through the coats of the blood-vessels of the pulp, and passes into the canals, through their open mouths in the walls of the pulp cavity, which resemble a sieve in appearance, on account of the great number of the openings which they present.

Tomes, in the year 1837, believed that the dentinal tubes were filled with an amorphous or uncrySTALLizable salt of lime—a rather singular idea, inasmuch as no-

where else in the human frame do we find a series of interconnecting vessels, or canals, containing a solid substance such as the salts of lime must be. The experiment which led him to this conclusion, was the following: "After preparing a thin section of human tooth, I placed it in the field of the microscope, and then added a little diluted muriatic acid. No sooner was the acid in contact with the section, than evidence of chemical action was rendered visible by the appearance of bubbles of gas, and these emanated not only from the external surfaces of the section, but also from the interior of the tubes, from which bubbles of gas were seen issuing in quick succession. When the action ceased, the tubes no longer presented the appearance of opaque dark lines, but were indistinctly seen filled with transparent fluid." This experiment is far from being conclusive, as the walls of the tubes or canals may, and most probably did, yield the bubbles of gas, in the same manner as the remaining portion of the section of the tooth furnished them. It affords, then, no proof that these tubes contain any salt of lime, whether it be amorphous or crystalline. This view of the matter afterwards occurred to Tomes himself, for he says, in a subsequent page of his work, that, upon more extended observations, he was induced to modify his first opinion, and to regard the evolution of gas from the tubuli as an evidence of the facility with which fluids are admitted into the interior of the tubes, and to consider that the source of the gas existed in the decomposition of their walls, rather than of their contents.

Blood-vessels, or vascular canals, have been occasionally, but very rarely, found in the substance of the

dentine, in addition to the tubes already described, which, except under peculiar circumstances, do not carry other than the serum of the blood, or, as it is technically called, the *liquor sanguinis*. The earthy constituents of dentine are about seventy-two per cent.

The enamel is that beautiful, semi-transparent substance which covers and protects the crown of the tooth, or all that part of it which is above the gum ; its brilliant whiteness renders it an ornament, while by its density and hardness, it serves as a flinty guardian to that part of the more delicate textured dentine over which it is spread. It consists of dense, closely united bundles of fibres, arranged side by side. They are of uniform size, about the $\frac{1}{450}$ of an inch in diameter ; in shape they resemble a six-sided prism. Like the tubes of the dentine, they are always so arranged, and in such a direction, as to offer the utmost resistance to external violence. The fibres of the enamel meet from the opposite sides, over the conavity and depressions in the crowns of teeth ; but the junction is often imperfect, fissures being left, and the dentine, being consequently more or less unprotected from the sources of irritation and decay which are constantly present in the mouth, becomes the seat of caries, which has often its commencement in these parts. Of this, however, we shall speak more fully hereafter.

The enamel fibres describe frequent curves, and where this coat is thickest there are they most bent. They often diverge and cross each other at considerable angles ; the spaces thus left by their divergence being filled up by shorter fibres. The neck of the tooth is the part most thinly coated with it.

Its earthy constituents are about 96·5 per cent, and the animal matter only 3·5 ; it is consequently the hardest of all the dental tissues.

The fibres of enamel, when recently formed, are tubular, the cavities being exceedingly small. They are connected together by the remains of the membrane, in sheaths of which they were originally developed, the membrane itself having been previously hardened or calcified by the deposit of earthly matter.

Its existence is to be detected by the discovery of fine dark lines between the fibres, the canals in which are sooner or later obliterated, either entirely or in a very great measure. The fineness of these dark lines is indicative of the perfect condition of the enamel ; when it is not fully developed, the lines are large and coarse, and the enamel itself is opalescent or discoloured in appearance. It may also present another variety of irregular development, which imparts to the teeth the appearance of being badly formed. The fibres consist originally of granules, which coalesce and constitute the minutely tubular fibre, fasciae or bundles of which form the enamel. These granules, the original fibrous constituent, may and do, in some instances, remain without coalescing, or become imperfectly united. As a necessary consequence, the enamel presents irregularities, such as pits, grooves, and depressions on its surface, and its colour is always different from that of the enamel which is perfectly formed.

As this state of the external coat of the tooth depends more or less on constitutional causes, to which arrests of development and malformations may be always referred, the mischief is not confined to the enamel, but involves

also the dentine, which presents peculiar imperfections, principally, however, in the shape of large cavities in its substance. A similar defect has also been observed in the enamel, the cavities being irregular in shape, with, in some instances, the fibres radiating from them, and in others, the peculiar non-coalescent granular structure being found. The enamel itself is generally discoloured, and the cavity is the seat of disorganisation, the surface not unfrequently being implicated, tending thus to favour the progress of decay.

According to Owen, layers of cells are found in the dentine, which he calls contour lines. Similar cells have also been discovered in the enamel, consequent on the imperfect junction of its fibres. This also is a malformation, and, like all others affecting the external protector coat, may involve the formation of decay.

The enamel of a molar tooth, taken from an adult, yielded phosphate, carbonate and fluate of lime, phosphate of magnesia, salts, chondrine and fat. Similar constituents are found in the dentine, but with a larger proportion of animal matters, and less of the earthy.

The *cement*, or true bone, is that portion of the tooth which invests the fangs, and is buried with them in the sockets of the jaw. It commences at the neck, where the enamel terminates ; at that part it is very thin, but it gradually increases in thickness to the apex of the fang, or root, where it sometimes even blocks up the entrance of the canal, through which the blood-vessels and nerves enter the tooth. Its structure is very similar to that of bone ; it consists of a congeries, or net-work of little cells, from which minute branches or tubes pass forth towards other cells in their immediate neighbour-

hood. The cement is highly vascular, being traversed by several blood-vessels, by which it is nourished. It follows the curvature of the fangs, and has been found to unite or cement several fangs of a tooth into one conical mass. This is most frequently the case with the roots of the second and third molar teeth of the lower jaw, and the wisdom tooth of the upper jaw. The structure of cement is in laminæ, the centre of the tooth being their common centre. It is nodulated on its outer surface. It is the softest of the three dentinal tissues, and contains the largest quantity of animal matter, the earthly constituents being 70·58 to 29·42 of animal matters.

The canals or tubes of the dentine, it should be mentioned, communicate with those of the enamel and cementum.

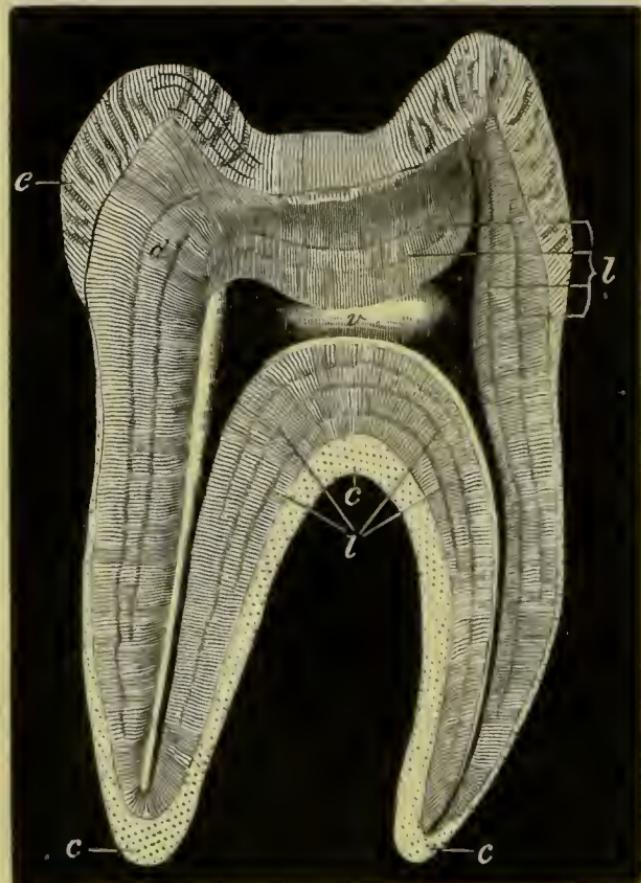
Of these three different substances, the cement is the most highly organised; next ranks the dentine, and lowest in the scale is the enamel. Their relative degrees of density are in similar proportion. Tomes asserts that dentine is but a modification of cement: that the dentinal tubes are but elongated cemental cells, and that this elongation is necessary to enable the tooth to perform its allotted part in the animal economy.

If a tooth be cut in half down its centre, a cavity will be found in it, corresponding in shape to that of the tooth itself, and prolonged as a fine canal through each fang to its apex, where it terminates by an open orifice. This central cavity bears the name of the "pulp cavity," because it contains a highly vascular and acutely sensitive substance, called the "pulp." This is of a soft texture, and is composed of loops of blood-vessels, consisting of the terminations of arteries

which convey blood to it from the heart, to supply the tooth with the means of nutrition, and of veins, which return the blood into the circulation after it has performed the duties for which it was sent to the tooth ; the pulp, in addition, contains the terminations of nerves, arising from and connected with the brain, which render it at all times acutely sensitive, and the seat of the extreme and agonising pain felt in tooth-ache during the progress of caries. These nerves and arteries enter the tooth through the open orifices in the apices of the fangs, pass up the canals already spoken of, as traversing those portions of the tooth, and thus gain access to the dental pulp. In like manner, the veins, or venous branches, after their formation in the pulp itself, coalesce, and, passing down through the canals, make their exit at the orifice in the root, to join with, and pour their blood into, the veins of the jaw-bones. Thus, then, we find the vital and sensitive portion of the tooth carefully guarded and protected from injury or pressure in its very centre, surrounded by the three dense and resisting substances previously described, and the open orifice at the apex of the root removed to the very furthest part possible from any liability to the effects of violence, and enclosed in a strong, well-made bony case.

The pulp is formed before the other parts of the tooth ; it is a special organ, abundantly supplied with blood-vessels and nerves, its principal function being to supply materials for the development and growth of the dentine. The microscope shows that it consists of a peculiar tissue, supporting small oval bodies, which are the first elements of animal or vegetable life we are

able to recognise. In the meshes of this tissue is what is called the plasma, which may be simply described as a clear, thick fluid. The pulp is subject to disease; its existence in a state of health is essential to the vitality of the tooth itself. When it has been destroyed by disease, the tooth sooner or later is loosened and lost. It abandons that system in which it played, in a state of integrity, an auxiliary part; but now, in accordance with a prevailing law in the animal economy, having become useless or extraneous material, is rejected.



This engraving, taken from "Owen's Odontography,"

faithfully delineates all those parts of the tooth to the description of which the preceding pages have been devoted. The letter *d* points out the situation and course of the dentine; *e* marks the enamel, *c* the cementum, or true bone of the tooth, and *v* the vascular pulp cavity; *l* indicates the position and course of Professor Owen's contour lines.

We thus find these apparently solid substances of which a tooth is composed, permeated by minute, interbranching canals, filled with a vital fluid, derived from the vessels of the dental pulp, and enclosed and protected by the hard portions or structures just described. All the more delicately constructed organs, or those parts of them upon the integrity and preservation of which more especially depends the due performance of their functions, are enclosed by tissues more or less resisting or protective. For example, the brain is everywhere encased in bone; the heart and lungs are defended in a similar manner; four of the organs of sense are bounded by osseous or bony walls; and the highly endowed dental pulp lies concealed within its dense envelope of enamel and dentine.

How admirable are the arrangements we have been reviewing. These organs, hard and resisting, in order that the end for which they are designed might be adequately accomplished, are withal so delicately composed that there is no part of them that does not receive a due supply of nourishment from the blood for its maintenance; and the continuance of the life of the tooth has evidently been as much the object of care as the preservation of the life of the body. Each portion is so exquisitely constructed, and all so curiously combined

that whilst lightness is preserved, strength is maintained. The want of sensibility, while the tooth is in a state of integrity, is shared with many other structures of the economy, such as bones, cartilages and tendons, as the high nervous endowment of them would be quite incompatible with the performance of their respective functions. The teeth, from their peculiar situation, whilst adding beauty to the expression of the countenance, and assisting materially to complete the contour of its lower part, spring forth as strong barriers of protection to the delicate organ of taste which they surround. Though in themselves passive organs, and firmly implanted, they are nevertheless set in an apparatus, to be acted upon by numerous highly organised and powerful muscles ; and thus the teeth, through the medium of the jaws, become important agents in accomplishing mastication, or the first process of digestion.

Mr. Owen, in his valuable work on "Odontography," has the following beautiful remark on the structure of the teeth :—"As regards the teeth, the fact has been established by microscopic investigations, that the earthy particles of a tooth are not confusedly blended with the animal bases, and the substances arranged in superimposed layers ; but that these particles are built up, with the animal basis as a cement, in the form of tubes or hollow columns, in the predetermined arrangement of which there may be discerned the same relation to the acquisition of strength and power of resistance in the due direction, as in the disposition of the columns and beams of a work of human architecture."

Arnott, in his admirable work on the "Elements of Physics," gives utterance to some remarks which serve

to display his views of the wondrous skill in the arrangement of the dental structures, and their adaptation to the purposes for which they were intended. He says:—
“The teeth rank high among those parts of the animal body, which appear almost as if they were the fruits of distinct miraculous agencies,—so difficult is it to suppose a few simple laws of life capable of producing the variety and yet perfect adaptation of parts which they exhibit. They form an extraordinary set of chisels and wedges for cutting and triturating the food, so arranged as to be most efficient in their operations, and with an exterior enamel so hard that in early states of society teeth were used where steel is now. It seems as if the laws of life, astonishing as they are, had still been inadequate to cause teeth, with their hard enamel, to grow as softer bone grows ; and hence has arisen a provision, perhaps more extraordinary still—a set of small teeth appear soon after birth, and serve the child until six or seven years of age ; these then fall out, and are replaced by larger ones, which last for life ; and the number is completed only when the man or woman is full grown, by four more teeth, which rise to fill up completely the now spacious jaw.”

Before taking into consideration the mode of development and of the eruption of the temporary and permanent teeth, it may first be advisable to cast a brief glance at the bony structures in which the fangs of the teeth are imbedded, as high as their necks. The jaw-bones, which constitute the greater part of the face, are three in number: two upper jaw-bones and one lower. With the relations of the upper jaw-bones to the orbital, malar, palatine, and nasal bones we have

here nothing to do; we shall examine them solely in their connexion with the teeth, the immediate objects of our inquiries. The anterior and inferior margin of the upper jaw, or maxillary bone, as it is technically called, consists of two plates of bone, separated from each other by cavities formed between them by osseous plates projecting from either side; these constitute the alveoli or sockets, in which the fangs of the teeth are sunk. A similar process is found on the upper margin of the lower jaw, the cavities formed between the two plates of bone being subdivided into smaller ones, each tooth-fang having a separate cavity or socket for its reeption. The alveolar arch of the upper maxillary bone is one of the earliest of the bony formations of the body, ossification eommencing in it about the thirtieth or thirty-fifth day after conception. According to some anatomists, that portion of it in which the incisor teeth are contained constitutes a speial point of ossification, independent of the remainder of the bone; because, in certain cases of hare-lip, that portion is frequently detached from the bone itself, while the existence of the incisor groove with the strictly defined extent of the piece of bone, the canine tooth never being included, and no similar portion of bone being found detached in any other part of either jaw-bone, seem greatly to strengthen this view, although it cannot yet be distinctly asserted that the incisor teeth in the upper jaw have a bone solely formed from a distinct centre of ossification. At birth, the alveolar arch of this bone approximates to the floor of the orbit, the large sinus or antrum of Highmore, as it is ealled, which, in the adult, forms a considerable portion of the bony support

of the cheek, being then apparent, but not to any great extent. In the aged, chiefly from the loss of the teeth, the alveoli, or sockets, are flattened and diminished in height, the walls having come close together, and forming a sharp edge at its margin.

The alveolar arch of the lower jaw has a smaller curve than that of the upper, so that the incisor teeth of the latter, when brought into approximation with those of the lower jaw, overlap and project beyond them. When, on the other hand, the lower teeth overlap the upper, a great deformity is the result, and injury to a greater or less extent to the teeth ensues. A person with his teeth in this condition is said to be "under hung." The sockets which form the alveolar arch are in both jaws pierced with openings communicating with a canal called the dental canal, through which course the arteries and veins by which the jaws, their sockets, and lining membranes, and the different structures of the teeth are supplied with nourishment. It varies greatly in its dimensions and in its situation at different periods of life. In the newly-born infant, before the appearance of the teeth, it occupies the lowest portion of the jaw, and is of very large calibre, its size continuing considerable up to the appearance of the second set of teeth. After their eruption, its situation corresponds pretty nearly with the central portion of the bone, while the canal goes on progressively decreasing in size during the whole of the adult period of life, and it becomes much contracted in old age, at which time it runs along the margin of the alveolar arch, which has undergone changes similar to those which take place in the corresponding arch of the

upper jaw. The prominence of the chin then becomes more marked, in consequence of the loss of the teeth and of the upper part or alveolar border of the bone.

Considerable changes take place in the form of the lower jaw-bone as the child advances towards adolescence. The angle formed by the ascending portion, or ramus, is at birth very obtuse, insomuch that under the age of four years it is impossible that the bone can be dislocated. The jaw-bone enlarges or increases in size at the back part, not near the chin, so that the additional molar teeth which the child acquires at the second dentition may find space and location, without disturbing or interfering with the teeth which correspond to those of the temporary set. This growth of the jaw continues up to the adult period of life, when all the permanent set of teeth have made their appearance ; the ramus is then nearly vertical with the body of the jaw-bone, and forms a right angle with it. When, in old age, all the teeth have been lost, and the alveolar arch is closed by the absorption of the partitions of the sockets, the jaw again changes somewhat in shape, and is, apparently at least, thrust forwards.

The sockets formed in the alveolar arches of the jaw-bones, in which the fangs of the teeth are imbedded, are lined throughout with a vascular membrane called the periosteum, the chief use of which is to give support to the vessels entering the bone or tooth ; it serves also to deaden the shock received by the teeth in the act of mastication. It is reflected from the sides of the alveolus to the fangs of the teeth, which it covers as high up as the neck. When healthy, this membrane is devoid of

sensation, but when inflamed it becomes very sensitive, and is the seat of severe pain. A diseased condition of this membrane from chronic inflammation or constitutional disease, has led to the loss of teeth otherwise apparently sound.

CHAPTER III.

HAVING, in the preceding chapter, spoken at some length of the peculiar structures which enter into the composition of the teeth, we shall now proceed to remark on their development.

The first rudimentary evidence of the commencing development of the teeth may be discovered as early as the sixth week after conception. A week after we have the first indication of the tooth-pulp, being that of the anterior temporary molar of the upper jaw, the teeth appearing in the upper before they show themselves in the lower. By the ninth week, the papillæ, or the primary condition of the tooth-pulp for the incisor teeth, appear ; and with the tenth, that of the last temporary molar ; thus completing, in the tenth week after conception, the full number of twenty papillæ, or tooth-pulps, corresponding to the twenty temporary teeth which make their appearance during the early period of infantile life.

Meanwhile, these tooth-pulps are contained between the layers of the dental groove ; and as they increase in

size, and change in shape, the bony walls within which they are incased increase correspondingly, and send out laminæ towards each other, which meet and coalesce, producing septa or partitions between the teeth. This formation commences about the tenth week, and first with the molar tooth, the pulp of which was first in the process of formation ; next come the canine, then the incisors, and lastly the posterior temporary molars, leaving, however, behind them a certain open portion of the dental groove. The formation of these septa, and the consequent separation of the teeth from each other, take place precisely in the same order as that which was employed for the development of the tooth-pulps.

The changes hitherto described are peculiarly interesting, more especially to the microscopic observer. It would have been useless to occupy space, and puzzle and confuse our readers with a technical description of the discoveries made by Retzius, Owen, Goodsir, and others, by the aid of the microscope, respecting the development of the teeth—cell-formations, plasmata, germinal membranes, nucleated cells, formative cells, cytoblastic cells, &c. &c., are terms readily intelligible to the anatomist and physiologist of the present day ; but a much greater space would be required, were we to seek to offer an adequate explanation of their application and functions, so that the general reader might be able to enter into and enjoy the wonderful beauty, and yet the extreme simplicity, of the formative processes employed by nature, and by nature's God, in the creation even of human teeth. We have contented ourselves with showing that, at the tenth week after conception, while yet the newly-created offshoot is but an inch

long, and the mouth itself but rudimentary, the first steps are taken for the formation and development of a tooth, the anterior temporary molar ; and that this is to be found in what is called the dental groove, which ultimately, as the result of many changes, becomes the alveolar process of the jaw-bone. In the same order, the progress of this wonderful creation still continuing, the newly-formed tooth-pulps, which previously were retained only between the walls of the dental groove, already mentioned, are separated from each other by projections, or septa, springing from the walls of the groove, and uniting and coalescing so as to form a wall, or walls of separation, between the different teeth.

These are certainly wondrous operations; nor are they all : about the thirteenth week, the tooth-pulps, which previously presented themselves only as simple rounded blunt masses, distinguished from each other, as the representatives of certain distinctive teeth, by their relative position alone, now begin to assume a characteristic form or shape, the incisor pulps presenting somewhat a resemblance to the future incisor teeth, the canine appearing more or less simple cones, while the molars resemble cones flattened transversely. While this change is going on, opercula, or lids to the follicles in which the papillæ are contained, are developed, the incisors having two, the canine three, and the molars four or five each, one for each tubercle. The growth of the pulp exceeded that of the containing follicle, prior to the fourteenth week, but after that date the relative rapidity of growth between them is reversed, the papillæ sinking into the follicle, and being almost quite concealed by their opercula, or lids.

At the close of the fourteenth week, greater changes still commence in the jaws of the being in process of formation. Small crescent-shaped depressions, immediately behind the inner lids of each of the temporary follicles, may be remarked; these indicate the position of the secondary dental groove, where are formed the papillæ of the permanent teeth, with the exception of the molars. The central incisors are first formed, next the lateral incisors, then the canines, the anterior bicuspid, and lastly the posterior. At this date, too, the opercula, or lids, fall down and close the follicles, to which they soon become united, thus changing the latter into shut sacs, the enclosed papillæ being then regarded as the pulps of the milk teeth. This important change occurs about the fifteenth week. The follicles in the crescent-shaped depressions, already spoken of as constituting the secondary groove, contain the papillæ of ten of the permanent teeth, which, with their follicles and opereula, undergo transformations similar to those just described as occurring in the temporary set.

About the sixteenth or seventeenth week, that portion of the primitive dental groove, which was described as being left open and unoccupied when the second temporary molar was formed, becomes the situation where the papillæ and follicles of the anterior permanent molars are developed, immediately behind the sac of the second temporary or milk molar. At that date, also, the cavities of the ten permanent teeth are situated between the milk sac and the surface of the gums as minute compressed sacs. All this while the pulps in the milk sacs are undergoing alterations and changes, and gradually assume appearances more and more approaching to the

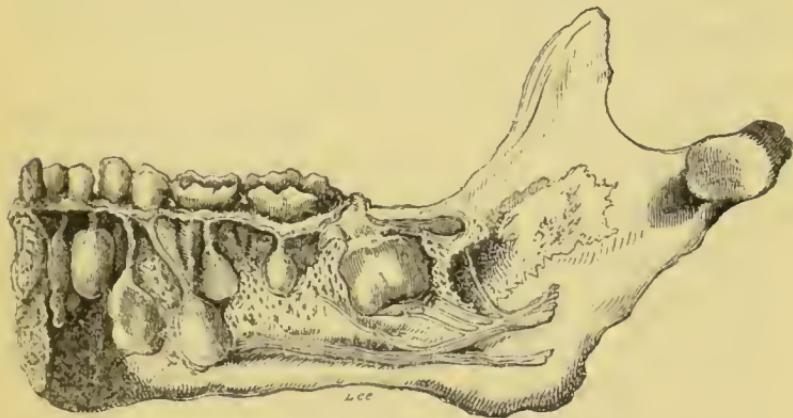
shape the teeth they represent will have, after their eruption from the socket; and those which will constitute thereafter the molar teeth begin to be divided at the base for the formation of the fangs, or roots.

All these transformations and changes, it must be understood, are carried out by the aid of the blood, which is conveyed to the pulp and its follicle by small radiating interbranching twigs from the dental artery, which wander over all the parts engaged in this interesting process, and supply them with the needed nutriment for their support, and for the effecting these changes in progressive development. The molar teeth are supplied by three or four branchlets from the main branch, one for each fang, which it enters by a very small aperture in its very apex.

The next change is the conversion of the follicle of the first permanent molar into a shut sac, a second with collapsed sides being the result of the non-adherence of a portion between the surface of the gum and the sac itself, which serves as a cavity of reserve for the second permanent molar and for the wisdom tooth.

Between this period and the seventh or eighth month we have the granular substance, which was previously contained in the sacs gradually absorbed, and caps of tooth substance deposited on the tips of the pulps. When the pulps are perfectly covered, the granular matter entirely disappears. During the period between the fourth and the eighth months the cavities containing the pulps of the ten anterior permanent teeth gradually pass to points posterior to the temporary set. About the fifth month these cavities are pear-shaped, the smaller

end being that opposed to the gums. At this time, also, the septa are formed in the primitive dental groove, and ossification commences in them, and is complete towards the close of the sixth month, when the alveoli, or tooth-sockets, are formed. These increase in size, in proportion with the milk sacs, and soon have small notches in the posterior wall for the permanent teeth. The permanent sacs enlarge more rapidly than the jaw itself does, and consequently the first permanent molar, about the eighth month, is found completely imbedded in the maxillary tuberosity. In thus passing backwards, the cavity of reserve between it and the gum is drawn out greatly in length, the gum itself being drawn upwards and backwards.



We have here represented one half of the lower jaw-bone of a child, containing all the milk teeth of the right side, and an incisor of the left. The removal of the plate of bone on the inner surface of the jaw has laid bare the sacs, or follicles, in which are contained the permanent teeth, with the exception of the wisdom tooth. The canal is also exposed, and the course of the nerve displayed. The large sac near the ramus of the

jaw is that of the first permanent molar, and above and behind it is seen the rudimentary sac of the second permanent molar. This excellent engraving, which so admirably represents the condition of the lower jaw at the period of life when the temporary set have been cut, the permanent teeth being still within their follicles in the interior of the jaw, has been copied from a wood-cut in "Quain's Elements of Anatomy."

The fangs of the incisors are formed about the time of birth, by the elongation of the base of the pulps, the deposition of dentine on it, and the adhesion of the contiguous portion of the sac to the surface of the dentine. While the fangs of the temporary set are in process of development, the permanent sacs continue to enlarge, and are separated from the temporary set by an osseous partition. The anterior permanent molar, about the eighth month of life, the arch of the jaw-bone being enlarged, returns from its position in the tuberosity, and with the cavity of reserve resumes its former place.

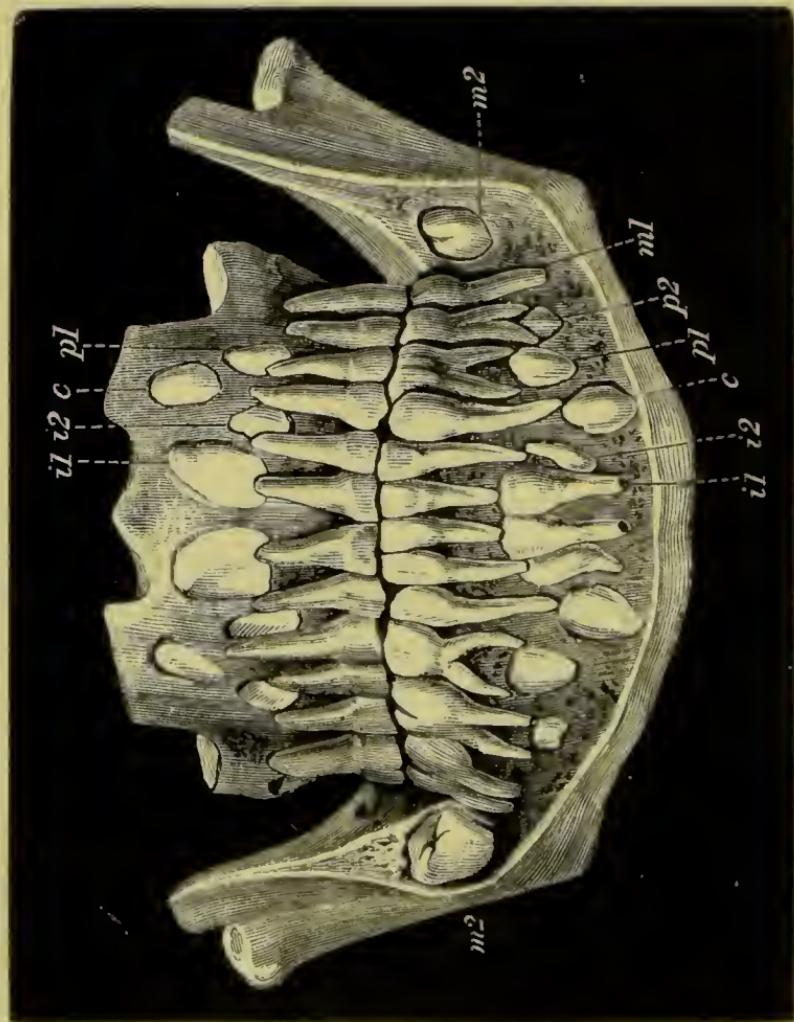
The central incisor teeth are generally cut about the eighth or ninth month; the crown is then perfect, but the fang not fully formed. When the tooth has worked its passage through the gum, it grows rapidly, but not so fast as it appears to do from the shrinking of the sac. The socket is soon adapted to the shape of the neck and fang. While the temporary teeth are thus advancing, the permanent recede; they are contained in bony cells, and connected with the periosteum in the ease of the front teeth, and with the sockets of the milk teeth, in the ease of the bicuspids, by a fibrous cord called the gubernaculum, which is in reality the obliterated portion of the pulp follicle. As the tooth recedes from the gum

this cord becomes longer: it disappears only after the permanent tooth has been cut.

The description thus given applies to the upper jaw; the difference in the development of the teeth in the lower jaw is so trifling, as to be undeserving of notice. The teeth are generally formed a few days later in the lower than in the upper jaw.

The annexed wood-cut represents an infant's mouth, with the milk teeth all cut, and the permanent ones in the bony cells in which they are contained. The figures and letters indicate the teeth respectively.

Their number is forty-eight, viz., twenty deciduous, all perfect, and twenty-eight permanent in different degrees of development. Bell thus describes this state of the jaws: The following, he says, is the relative position of the two sets at this period: the permanent central incisor of the lower jaw is placed immediately between the temporary, with its points directed a little backwards, behind the partially absorbed root of the latter. The lateral incisor, not yet so far advanced, is placed deeper in the jaw, and instead of being immediately beneath the temporary, is situated with its point beneath the roots of this and the canine. The permanent canine is still very deeply imbedded in the bone, with its point rising between the roots of the temporary canine and the first temporary molar. The two spreading roots of the latter encompass, as it were, within their space, the first bicuspid, and those of the second temporary molar, in like manner, the second bicuspid. The same state obtains in the upper jaw, but the teeth are more crowded. The lateral incisor is placed further back, and the canine and bicuspids are directed more outwardly.



A careful study of the beautiful process by which teeth are formed and developed, while yet the child is unborn, must convince every one that every stage of the process is one of extreme delicacy, and that even a slight alteration or modification of the causes operating in their production, must materially impair the perfection of their structure, and induce defects and errors of formation, leading sooner or later to decay. The child, while yet in its mother's womb, is dependent on her vital fluid for sustenance, support, and growth. If then the mother be in good, sound health, with a well-regulated mind, and her passions and desires in due subjection, we, knowing that her bodily health must be in that state best adapted for the development of the child she bears, may anticipate that in every particular it will give evidence of health and vigour. The teeth, the special subject of our inquiries, will show this as readily and as fully as the other parts of the frame; while on the other hand, if from any cause the mother's health has suffered during her pregnancy, from bad, insufficient, or excessive diet, from indigestion, late hours, excesses of any kind, the indulgence of the passions—the emotions of the mind being most influential over the body—we may then expect a puny, ill-conditioned, unhealthy offspring, with, among other evidences of impairment of health, teeth which are cut with great difficulty, and soon fall into decay. The imperfections spoken of, when treating of the structure of the dentine and enamel, as leading to the favouring the progress of caries, are to be found in such children. They are in fact what is professionally termed “arrests of development,” the result of a sudden and more or less prolonged cessation of the growth of

the teeth, so that the parts concerned stop at one or another period of their progressive development; and when the process of growth is resumed, the injury that has been inflicted is never fully repaired, although occasionally it may be somewhat botched over. It is very essential, therefore, that the pregnant female should be exceedingly cautious in all matters relating to health. A good, wholesome, and nutritious diet, with early hours for repose, avoiding every opportunity for dissipation, are among the most efficient; while every irregularity or disordered condition of the frame should be brought at once under the resources of the medical art. Nor does the duty end here. Those who are desirous of healthy children, with strong, sturdy constitutions, will be as guarded during the period of suckling, as during that of pregnancy. Without such care, the mother cannot hope to be gratified by the earlesses of children, having cause to rejoice at the results of her care for them, in the preservation of their health, and the strength and vigour of their frames.

There cannot be a doubt respecting the fact, that it is as necessary to watch over and guard the health of the mother, whilst suckling her offspring, as during the period of gestation; for upon the healthy, sound condition of her milk depend the growth and strength of the infant. Some mothers, who are deserving of every praise for their conduct during these interesting periods of their existence, err greatly and injuriously by protracting the period during which they supply the infant with breast-milk. When children are suckled beyond the time nature has intended—and some continue at the breast till they are two or three years old—the milk becomes much deteriorated in quality, and totally unfit to sup-

port life. In many instances even, it is decidedly injurious to the mother and child. Protracted lactation should therefore be strictly avoided by all who are anxious for their own health, and for that of their children.

The process of teething, as the eruption of the temporary and permanent set of teeth is termed, is one of the utmost interest and importance to the medical attendant, the anxious parent, and to the child itself. In very many instances it unfortunately happens, that the absorption of the gum, and dental sac, set up by the onward progress of the advancing tooth, excites great irritation and fever in the animal economy, which not unfrequently settles in some one or other of the more important organs of the body, and induces disease, which, if not speedily combatted by the resources of the medical art, may either lead to permanent and irretrievable mischief, or to the absolute destruction of life. It behoves then all who are interested in the welfare of children, to watch carefully at this period of their infantile existence for the signs and evidences of commencing irritation in any part of the system, and as soon as they appear, however trifling they may be, more especially if there be heat and swelling of the gums, with the other symptoms of approaching teething, at once to seek for that medical assistance, by which alone the impending mischief may be warded off.

We have already given a brief sketch of the development of the teeth during the period the embryo is carried in the mother's womb, and have brought up our remarks to the time prior to dentition. The teeth continue to grow after the birth of the child, until, in the average of instances, the crown in full growth makes

its appearance externally, having caused, by the pressure it exerts, the removal of all the parts lying over it. The fang is not complete until after the crown of the tooth has presented itself above the level of the gum. Before this occurs, certain changes take place in the gums, which indicate to the experienced eye and finger, that nature is urging forward the eruption of a tooth. The gum becomes broader, swollen, hot, and tender; the child is constantly dribbling, and is never easy unless it has a finger, or some substance in its mouth, to press upon the inflamed gum. Much pressure, however, causes a fit of crying, and the little sufferer frequently in addition presents signs of general irritation and irritability. It is fretful, frequently crying, and is pacified with difficulty; the cheeks are flushed, sleep restless and disturbed, and the stomach and bowels are more or less disordered. In some instances, however, the teeth are cut with little or no disturbance of the health, and almost the first indication given that the process of dentition has been going on, is the appearance of the tooth above the level of the gum.

The first teeth of the temporary set are cut in general about the sixth, seventh, or eighth month of infantile life; these are the central incisors of the lower jaw, and they are followed in the course of a week or two by the same teeth in the upper jaw. It should be fully understood, however, that in stating the sixth, seventh, or eighth month, as the period when these teeth are first seen in the mouth, the average is taken of the process of teething in healthy children. Teeth have been cut much earlier, and again the process has been delayed till the tenth, and even the twelfth month, the time of their appearance varying greatly in different children, owing

to the state of their health, their freedom from disease, hereditary or acquired, the strength of their constitution, &c. Again, some children cut their teeth across, as it is termed, that is say, certain teeth appear above the gum in an order different to that usually met with ; the canine perhaps before the incisors, and certain of the molar teeth are found to be making their way most irregularly.

In the usual course of nature, however, the central incisors of the lower jaw are cut about the time already stated, and their appearance is followed some days afterwards by that of the corresponding teeth in the upper jaw. The lateral incisors of the upper jaw next make their way ; this occurs about the tenth or eleventh month, and those of the lower jaw soon follow. A month or two after these, we have the anterior molars of the lower jaw piercing through the gum, and soon after those of the superior maxilla. The canines next appear, and lastly the second milk molars, between the age of two years and two and a half.

The following table, prepared from some of the best authors on dental surgery, is given by Tomes, as illustrative of the difference of opinion respecting the periods when the temporary teeth make their appearance.

Authors.	Central incisors.	Lateral incisors.	Canines.	1st molar.	2nd molar.
	Months.	Months.	Months.	Months.	Months.
Fox	{ 6, 7, 8 extreme cases 4 to 13	7, 8, or 9	17 to 18	14 to 16	24 to 30
Hunter	7, 8, 9	7, 8, or 9	20 to 24	20 to 24	20 to 24
Bell	5 to 8	7 to 10	14 to 20	12 to 16	18 to 36
Dr. Ashburner	{ 7th lower jaw 8th upper jaw	9th upper jaw. 10th lower teeth.	16, 17, 18, 19, or 20	12 to 14	22 to 30

The irregularities so often encountered among the permanent teeth, are rarely met with in the temporary, either as regards position, number, form, or date of eruption. The well-known, but somewhat apocryphal tale respecting Richard III., has, however, had its parallel of late date. Tomes mentions a child, five weeks' old, whose mother complained that it was born with two teeth in the lower jaw, by which her breast, and its own upper jaw, had been injured. On examination, he found two sharp-edged, rough-surfaced incisor teeth sticking up from the centre of the lower jaw. They were ill-shaped, imperfectly coated with enamel, and loose in the gum, and stood across, instead of in a line with the alveolar arch. These were removed, and it was found that the fangs were not more than one-third developed. In fact, the teeth had attained about the normal amount of development for the age of the child, but had been protruded through the gums before they were fitted for eruption. An after-process had been effected before the preparatory one had been completed. A similar case has occurred in my own practice.

Dr. Brown, an American physician, mentions a still more extraordinary example, which he published in the "American Journal of Dental Surgery." A child was born with the central incisors through the gums. They were extracted. Two other children were afterwards born of the same mother, in each of whom the same singular anomaly was found. Their teeth were allowed to remain. In each case the children were females. Dr. Crump, another American physician, reports a case of full dentition, at birth, in a still-born negro

child. The sockets were very imperfectly formed. Dr. Lethbridge, it is said, has met with a similar instance.

Imperfections in dentition are of occasional occurrence. Sometimes the central incisors are absent altogether ; in others again, even when the child has attained its sixth year, it may have a few front teeth only. Two cases have been recorded in which the persons reached old age, without even cutting a tooth. In a case, exhibited by Dr. Brinton at the Pathological Society, the alveolar processes of the upper jaw-bones were wanting, but the canine teeth were present on each side, lying parallel to the maxilla. I myself examined a child, whose mouth was apparently well formed. Nevertheless I detected the absence of the right canine tooth of the lower jaw during the first dentition. This was a deficiency that a dentist or a surgeon only could detect, as the jaw appeared to possess its full complement of teeth, there not being any vacancy in the place where the canine should have been found. As I looked upon this as an interesting specimen of dental pathology, I made a model of the mouth, which is now in the possession of my friend, Mr. Tomes.

It has been already stated that the irritation caused by the process of dentition will, in many children, induce disorder, and even permanent disease of other, and important organs of the body. The first signs indicative of the commencement of that process are mostly attended by fever, and general disorder of the system. The child is irritable and fretful ; the skin hot and dry, the bowels disordered ; the scalp hot, the eyes heavy and dull, or preternaturally bright,

the mouth slavers, the gums are swollen, broader, and more red than usual, hot and painful to the touch : the appetite is lost ; the little patient taking the breast by fits and starts, and speedily loosing its hold of the nipple. The bowels are generally disordered, the stools being relaxed, and often of a pale, pasty appearance, or green, or clay-coloured. Frequent purging, with gripping pain, is not an uncommon concomitant of dentition. The head, however, may be the part that sympathises most during teething ; when the irritation has been continued for some little time, or even very early during the attack, the infant may be seized with convulsive fits, recurring often with great rapidity, and ending not unfrequently in death, if the appropriate preventive, and remedial measures, be not adopted. A less severe form of disorder, thus induced, may, however, attend on this cause of irritation ; eruptions on the scalp, cutaneous inflammations, and discharge from behind the ears, inflammation of the eyes, &c., all in childhood owe their origin at times to the concomitant disorder of dentition. Water on the brain and epilepsy, generally of a temporary, but sometimes of a permanent character, may be thus excited. Again palsy, affecting one or more limbs, may be induced, and may become permanent, or even prove the precursor to a fatal termination.

On this point, Dr. Henry Davies, late of Saville-row, Physician to the British Lying-in Hospital, and now of Brighton, has added his testimony in proof of the very serious diseases which are sometimes set up in consequence of dentition. In a communication, which he addressed to the Medical and Chirurgical Society, he

describes the ease of a female infant, rather more than a year old, who had cut two lower teeth well ; but who one day, having been previously very lively, and having taken her usual exercise in the baby-jumper, and been put to bed apparently well, soon after became restless, and slightly shivering. Early the next morning, she uttered a peculiar cry, and the nurse gave her some Dalby's earminative. This not affording any relief, she was put into a warm bath, and had a dose of eastor-oil. A few hours after, she was violently sick, turned cold, and looked blue about the mouth, nose, and eyes. She was then put into a warm bath again, when she appeared to lose the entire use of her limbs, and her countenance became vacant. Dr. Davies did not see her till the evening of the second day,—much valuable time being thus lost. She was perfectly conscious ; head cool, and the temperature of the surface generally natural, the pupils contracting under the influence of light : pulse moderately frequent, small and languid : tongue slightly coated. The upper extremities were devoid of all power of motion, or sensation, even from pinching or pricking with a pin ; but the lower extremities were drawn up on her feet being tickled. Nothing unnatural could be detected in the spine or elsewhere. Leeches had been applied behind the ears ; a blister was placed between the shoulders, and aperients, &c., were administered. During the five weeks that the child lived, no change took place in the paralytic symptoms, and she remained conscious to within a few hours of death. During this time she cut six teeth. The appearances after death showed some degree of determination of blood to the brain, which,

with the upper part of the spinal marrow, was peculiarly firm. There was an ounce and a half of sanguinous fluid covering the surface of the brain.

In commenting on this very interesting case, Dr. Davies stated that palsy, coming on suddenly, not preceded nor accompanied by any apparent disease of the brain, is by no means uncommon in children between the first and tenth years. In all these cases, he believes—and facts fully demonstrate the truth of his opinion—that the predisposing cause is the process of dentition. The exciting or immediate cause has, he says, in the majority of cases, appeared to be some derangement of the digestive organs. In this peculiar case, he remarks that the exciting cause was the succession of shocks received by the spinal cord through the use of the baby-jumper.

This interesting and valuable instance of palsy occurring in an infant, bears directly on the statements that have been advanced respecting the dangerous consequences of neglected dentition. Had this poor little sufferer been subjected to the innocuous and highly beneficial operation of lancing the gums on the morning she was taken ill, it is more than probable that all the serious symptoms which ensued would have been prevented, and the infant still alive to rejoice the hearts of its parents. That the distress and nervous derangement dependent on dentition were the predisposing cause of the palsy, we have the authority of a distinguished physician, whose energies and medical knowledge have been especially directed to the investigation and treatment of the diseases of women and children, for believing. Every fact in physiology and pathology

at all bearing on the subject confirms this opinion. The cases yet to be narrated, and the facts which have been already made known, are such as not to admit of any doubt upon the subject. Warm baths and aperients, and the application of leeches, were relied on to remove a disease affecting the frame generally, and the nervous system especially, while the simple but most efficient remedy, lancing the gums for the removal of the local cause of this general mischief, was apparently wholly neglected; at all events, no mention is made of its performance in the records of the case in the medical journals; it is therefore only fair to presume that it was not had recourse to. In this respect no blame attaches to the medical men, as their assistance apparently was not sought until the domestic pharmacopæia had been exhausted, and the disease was fully established. It is much to be regretted that the non-performance of this trifling operation led to the sacrifice of a human life, but it is to be hoped that the record of the painful results following its neglect will serve to open the eyes of parents and nurses to the folly of which they are guilty, in offering a sustained and almost systematic opposition to lancing the gums—a proceeding which has been the means of preventing, and of removing a vast amount of infantile disease, and consequently of saving many lives.

Similar testimony is borne by Dr. Marshall Hall, in his work, "On the Diseases and Derangements of the Nervous System," p. 198, in which he has published the case of a little girl, twenty months old, a daughter of Dr. Grant, of Thayer Street, who, while suffering from dentition, lost the power of elevating the right arm—that of closing the hand and of bending the fore

arm remaining. There was not any symptom of brain affection present. The ease was clearly one of palsy from teething. The gums over the four eye-teeth, which were all coming forward, consequently were freely lanced every second day; the bowels well moved, and the diet strictly regulated. For fear of hidden disease within the head, two leeches were applied. A few days after the attack of palsy, the little girl was seized, in the early part of the night, with a fit of crowing inspiration. This confirmed Dr. M. Hall in his opinion as to the cause of the attack, and the event justified the view he had taken. The child recovered perfectly, without any energetic remedy being used for the cerebral affection, by continued attention to the state of the gums, the stomach, and the bowels; an event, he says, which could scarcely have occurred from such simple measures, had there been such decided affection arising from disease of the brain. The palsy and the cough completely disappeared when the four teeth made their appearance in the mouth.

A boy of my own, fifteen months old, during dentition, was discovered at one o'clock one morning in a state of stupor, and quite insensible to external impressions, he having previously manifested an extraordinary tendency to sleep. The limbs were all powerless, and apparently paralytic. The irritation of the brain which caused these symptoms, was excited by the process of dentition, which was going on with reference to the canine teeth, the apices of which were just perceptible above the gum. The poor little fellow was placed in a warm bath, leeches were applied to the temples, a blister to the nape of the neck, and the gums were freely lanced.

He nevertheless remained in a state of stupor for a day and a night. Calomel, and the other remedies requisite in such cases were employed, and at the end of that time he became sensible, and shortly afterwards recovered the use of his limbs. He remained, however, more or less ill and suffering until the teeth, which had barely pierced the gum at the commencement of the attack, were fairly through. His health was not quite re-established till after the lapse of a month. Several cases of palsy affecting one arm, caused by dentition, have fallen under my notice. The operation of lancing the gums, and the employment of appropriate remedies, have generally sufficed to effect a cure in a shorter or longer period of time.

These are instances of great severity of disease caused in these poor little sufferers by neglecting the indications of approaching dentition, or by the sudden and very great irritation which it sometimes sets up in the system. The next case I shall mention is one of a singularly anomalous nature, but clearly dependent on teething for its cause. My friend, Mr. Whitmore, a surgeon practising in Oxford Street, has furnished me with the particulars of an interesting case under his care, exhibiting one of the anomalous results attending dentition. A female infant, seven months old—at birth a fine and perfectly healthy baby—became fretful and restless, evidently suffering from the irritation consequent on cutting her first tooth. There were heat of mouth, some swelling of the gums, and slight derangement of the bowels. This state continued a few days, when one morning, whilst dressing her, her mamma felt something beneath the skin of the abdomen, about an inch and a half obliquely to the left of the navel,

which on each inspiration was forcibly propelled to the surface, as though it would protrude through the skin. On careful examination, it was found to be blunt-pointed, of a hard cartilaginous feel, and in size and shape resembling a very small *tin-tack*. Handling it, or even forcibly pressing it, caused no pain. The child was seen by Dr. H. Davies and Mr. Beale, neither of whom expressed any decided opinion as to the nature or character of the small tumour. On the second morning after this, it entirely disappeared, and simultaneously as it were appeared a tooth, the front incisor of the left side of the lower jaw. The little swelling re-appeared a few days afterwards, again to disappear on the cutting of another tooth. A tooth was next cut in the upper jaw; no swelling was observed on that nor on a subsequent occasion. It was in all probability a swollen sebaceous gland, its enlargement being owing to the irritation of the bowels, caused by teething.

Cases out of number might be brought forward to illustrate the serious consequences which are the result of teething. Those already given are, however, sufficient to warn affectionate parents of the dangers that await their offspring during this, the most hazardous period of infancy.

It is, however, advisable to state that, at a meeting of the Fellows of the Medical Society of London, in December last year, it was the unanimous opinion of the medical men present, that that very formidable disease, *laryngismus stridulus*—the crowing inspiration of infants, was, in the majority of instances, dependent on dentition, and to be prevented or cured by such measures as will remove its concomitant irritation.

Drs. Evanson and Maunsell, in their work on the

diseases of children, support the views previously advanced, as to the dangers attending teething, in the following words:—"The more suddenly the teeth are developed, and the greater the number coming out together, the more will be the local irritation, particularly should any obstacle be presented, as a disproportion between the rate of development of the teeth and the jaws. The earlier the age at which dentition commences, the severer is likely to be the constitutional disturbance, from the greater susceptibility of the system; for the natural susceptibility is heightened by the rapid evolution which the brain is undergoing at this early period, in addition to which there is local determination of the blood, caused by the process going on, so that the nervous system is in the highest state of irritability; hence is symptomatic disturbance of all parts, but more particularly of the brain, so liable to be induced at the time of teething. The proneness to this will be increased by anything that tends to deteriorate the general health, as the injurious effects of improper food, bad air, &c. Delicate children suffer more constantly than the robust, their dentition being tedious; and in them bowel complaints, with wasting, frequently attend. Any complaint, in short, to which a predisposition may have existed, is likely now to be developed; and any disease contracted at this time (as measles, &c.) is attended with additional danger."

This is not the place to dwell on the treatment of such cases; that task belongs to the medical practitioner, who should be at once summoned when symptoms indicative of disordered health arise during teething. It is impossible, however, to refrain from

making some remarks respecting the necessity of lancing the gums during dentition—a slight surgical operation productive of the utmost relief to the little sufferer, but to which many parents, most unwisely and unaccountably, offer the most determined opposition. No one can feel surprised at the various disorders and their severity which are set up in the system during teething, when it is recollectcd that the process itself is attended with considerable local suffering and inflammation, and that the little patient is at a period of life, when the nerves are most prone to receive impressions, and most subject to external and internal causes of excitement. The tooth which has to make its way into the mouth from within the follicle in the socket, in which it had hitherto been confined, has, by means of pressure from behind, to cause absorption of all the parts which impede its progress. This is necessarily a work of time ; the gum and the mucous membrane covering it, do not readily yield to the powers of the absorbents ; inflammation is set up, the parts are put upon the stretch, the small nerves which supply them with sensation partake in the inflammation, and become exquisitely sensitive, but still they do not yield. And consequently one or other of the disorders and diseases, to which we have alluded, is induced ; the child becomes much worse in its health ; all the previous symptoms are aggravated, and unless some decided step be taken, its life will be lost. What step so ready, so necessary, so clearly pointed out by nature, as that of **LANCING THE GUMS?**

Medicine and surgery have been defined as the arts by which nature is to be aided in her operations. What under these circumstances is the process nature adopts ?

By a slow and unequal action, the edge of the tooth makes its painful way through a swollen and inflamed gum, the absorption of every atom of which being the cause of severe suffering, and perhaps of irremediable mischief to the little victim of mistaken and misguided affection. And why do parents object to this simple operation? Because an old woman's tale supports the ridiculous theory that the *cicatrix*, or scar resulting from the lancing, will be more difficult for the tooth to pierce through, than the sound or at least the previously unwounded gum would be. This is an error that few educated persons in the present day would venture to support. The newly-united part, where the incision has been made, is absorbed much more readily under the pressure of the tooth, as it advances externally, than would be the original sound gum, and tough mucous membrane covering it, because it being of more recent formation, and the result of effused lymph, has a less degree of vitality or life to resist the pressure of the tooth.

In sea-scurvy, a disease which formerly devastated our fleets, destroying the seamen, so that in Anson's time, our ships of war were frequently less than half manned: in that fearful disease it was found that when the sailors had previously suffered from wounds, or ulcers, or broken bones, of no matter how ancient a date, the cicatrices gave way, and the solder of the broken bone yielded, while the other sound and uninjured flesh remained intact, and unimpaired. In like manner then, as in sea-scurvy, the parts previously wounded, or ulcered, yield sooner than those which are sound, so the *cicatrix*, left after the gum has been

lanced, will also yield more readily than would the gum, if it had never been incised. But even supposing it were true that the hardened scar would be absorbed with greater difficulty, and the process of teething become thereby more protracted, is that to be alleged as a reason why the operation of lancing the gums is never to be practised, and the unfortunate little sufferers to be left, to bear the agonies of pain and inflammation in the mouth, and the more general disorders caused in the frame by the irritation thus set up ? Is the life of the infant to be endangered and sacrificed by the non-performance of an operation, slight in itself, unattended with danger, and causing but little suffering ; and which, when practised in time, invariably affords relief? The result so much feared by mothers and nurses—the greater impediment to the passage of the tooth—can be averted or remedied by the repetition of the operation. The hardened gum—always supposing it to increase the difficulty, which it does not—can be divided and separated by the gum-lancet, from time to time, not only without risk of danger, but with manifest benefit and relief to the infant. It is an operation which is serviceable, first by removing the tension of the gum, and of the small nervelets in it which are strained and stretched by the protruding, compressing tooth ; and secondly, it affords relief by the slight loss of blood which follows, and which serves to lessen the attendant inflammation.

In some cases, where the brain is in a state of great irritation, convulsive fits rapidly succeeding each other, each one being worse than its predecessor ; and in many others also, where the general disordered condition of the

internal organs runs high, it becomes necessary to have recourse to lancing the gums daily, and even more frequently still, in addition to other remedial measures, in order to keep down the local inflammation and irritation.

In Dr. Marshall Hall's "Observations on Medicine," p. 30, there is a chapter of so much value and truth on this very subject, that, were it not that space forbids, as it would add so much to the strength of our argument, we would willingly transcribe the whole. It is entitled, "On the motive for the scarification of the gums during dentition." We must content ourselves with making some extracts from it. He observes, p. 30 :

* "There is no practical fact of the truth and value of which I am more satisfied, than that of the effect and efficacy of scarification of the gums in infants, and not in infants only, but in children. But the prevailing, I may say the universal, idea on this subject is, that we should lance the gums only when the teeth are ready to pierce through them, and only at the most prominent parts of the gums, and as the occasion to which I have referred may require ; and no idea of this important measure can be more inadequate to its real value. The process of teething is one of augmented arterial action and of vascular action generally ; but it is also one of augmented nervous action ; for formation, like nutrition, secretion, &c., generally, is always one of nervo-vascular action ; and of this the case in question is, from its peculiar rapidity, one of the most energetic. Like other physiological processes, it is apt to become, from that very character of energy, pathological, or of morbid

activity. It is obviously, then, attended with extreme suffering to the little patient ; the brain is irritable, and the child is restless and cross ; the gums are tumid and heated ; there is fever, an affection of the general vascular system, and there are, too frequently, convulsions of various degrees and kinds, manifested in the muscles whieh move the eye-ball, the thumb and finger, the toes ; the larynx, the parietes of the respiratory cavities ; and the limbs and frame in general, affections of the excito-motor part of the nervous system, and of the secretion of the liver, kidneys, and intestines, affections of the ganglionic division of that system."

Dr. M. Hall next examines the causes which lead to such extensive and varied irritations in the systems of children, whieh he considers to be seated, not in the gums alone, but in the entire dental system ; and then strongly recommends the scarification of the base of the gums, as well as of the apex, and he remarks : "Better searify the gums *unnecessarily* one hundred times, than allow the accession of one fit of convulsions from the neglect of this operation, which is equally important in its results, and trifling in its character. And it is not merely the prominent and tense gums over the edges of the teeth whieh should be divided ; the gums, or rather the blood-vessels, immediately over the very *nerves of the teeth* should be searified and divided. Now, whilst there is fever or restlessness, or tendency to spasm, or convulsion, this *local blood-letting* should be repeated daily, and in urgent cases even twice a day. * * * A skilful person does it in a minute, and in a minute often prevents a most serious attack ; an attack which may eripple the mind,

or the limbs, or even take the life of the little patient, if frequently repeated. There is, in fact, no comparison between the means and the end : the one is trifling, and the other so momentous." Nor is it, he asserts, only while the teeth are making their way through the gums that scarification or lancing should be practised. The most marked case in which he observed the instant good effect of scarification, was one in which *all the teeth had pierced the gums.* "And there is," he says, "a phrase among nurses, viz., 'the breeding of the teeth,' which may be taken as evidence that *before* the teeth actually reach the borders of the gums, they may prove the source of much irritation."

Can words of greater power be used, to urge and enforce on parents the absolute necessity for this operation under the circumstances we have indicated? The restoration of health, the preservation of life, and of the powers of the mind and body, may frequently be ensured by the careful and appropriate use of a small piece of steel on the inflamed gums of an infant ; and, on the other hand, all these may be and are frequently endangered by its neglect, owing mostly to the unwise, and unaccountable opposition of parents, or of an ignorant, prejudiced nurse. It seems strange that such a prejudice should still exist, but it does so unfortunately, and it is the duty of every one to do his utmost to eradicate it.

CHAPTER IV.

HAVING pointed out and described in the preceding Chapter the mode of development and eruption of the temporary, or milk-set of teeth, we have now, prior to making any observations on the preservation of the teeth generally, and the treatment of their diseases, to turn our attention to the permanent teeth, which all this while are enclosed in their follicles, within the bony walls of the jaws.

Nature, in providing two sets of teeth, the temporary and the permanent, has made arrangements to remedy the inconveniences that would otherwise attend the continued increase in size, and the great alteration in the shape of the jaw-bones, principally, however, of the lower maxilla, while the teeth of the first set continue without further development.

The change in the shape and growth of the jaw-bones commences when the infant is between two and three years of age. They then begin to elongate, and about

the fifth year there is ordinarily sufficient space to admit the first permanent molar teeth posterior to the temporary. When the process of the first dentition has been completed, that part of the jaw in which the milk-teeth are contained increases but little in size, its growth being confined to the back part, between the second temporary molar and the rami, with their articulating processes. This increase in the size and alteration of the shape is necessary, because the permanent teeth are thirty-two in number, the temporary being only twenty. John Hunter pointed out a curious physiological and pathological fact, when he demonstrated that the twenty permanent teeth, corresponding to the same teeth of the first dentition, do not occupy a greater space in the jaws than did the milk-teeth, although they are generally larger. The reason is, that the teeth called the *bicuspid*s, or *premolars*, in the second set, are smaller than those they replace, thus exactly compensating for the larger size of the incisors and canines. This fact also explains the want of growth in that part of the jaw in which these teeth are to be found. Bell and others, however, contend that there is some degree of growth, even in the arch of the jaw. Bell remarks that, after repeatedly examining the same jaw-bone at different ages, and comparing the results, he has no hesitation in saying that the ten anterior permanent teeth occupy a somewhat larger arch, than the temporary ones which preceded them.

The change in shape of the jaw-bones produces necessarily a corresponding alteration in the form of the features—a change not generally noticeable, as it is exceedingly gradual, because the process of growth and

alteration of form in the bone commencing in infancy, is continued through childhood, even up to and beyond puberty.

Not only does the alveolar or dental arch in the course of time become enlarged, so as readily and without difficulty to contain a corresponding complement of teeth of a larger make, but the rami, or ascending portions of the lower jaw-bone, by which it is articulated to the head, which form a remarkably obtuse angle with it in early childhood, so as to preclude the possibility of dislocation of the lower jaw before the end of the fourth year, change their direction to a certain extent, assume a much less oblique position, with reference to the remaining portion of the bone, making almost a right angle with it, and thus, while at the same time the walls of the sockets are more separated from each other, together they afford more room for the teeth, which, as was before said, are much more numerous in the second dentition than in the first.

The following is the order in which the teeth of the second dentition commonly make their appearance. The process generally commences about six or seven years after the birth of the child, and the eruption of the second molars usually occurs about the twelfth or fourteenth year. The last teeth of the set, or wisdom-teeth, as they are called, are not cut, as a rule, until about the twentieth year, often much later, and not unfrequently not at all.

Dr. C. Harris says that these teeth, in some cases, do not show themselves until the thirtieth, or even fortieth year, and within the last few months, I

myself have extracted one of them for a gentleman, seventy-four years of age, who informed me that it was not cut until he had attained his seventieth year.

There is considerable irregularity in the periods when the teeth of this set make their appearance above the jaw, but not so much as with the first set ; the average dates are as follow :—

	Bell.	Harris.
First molars, from . . .	6 $\frac{1}{2}$	5 to 6 years.
Central incisors . . .	7	6 to 8 ,,
Lateral incisors . . .	8	7 to 9 ,,
First bicuspids . . .	9	9 to 10 ,,
Second bicuspids . . .	10	10 to 11 $\frac{1}{2}$,,
Canine	11, 12	11 to 12 ,,
Second molars	12, 13	12 to 14 ,,
Third molars, or wisdom-teeth	17, 19	18 to 21 ,,

Maury fixes the period for the eruption of the first four molars at from six to eight years, and Desirabode at from six to seven. The teeth of the lower jaw, in the second dentition as in the first, are usually cut some short time prior to those in the upper.

The shedding of the temporary set of teeth generally commences about the fifth year of age. Their fangs gradually disappear, being removed by absorption.*

* Each milk-tooth is developed from its germ, and in the course of its own development, separates a portion of itself to be the germ of its successor; and each, having reached its perfection, retains for a time its perfect state, and still lives, though it does not grow. But at length, as the new tooth comes, the deciduous tooth dies ; or rather, its crown dies, and is cast out

which generally begins in or near the apex, where one or two small holes are formed, which continue to enlarge upwards, until the whole of the fang has been removed; and occasionally even part of the interior of the crown, when the further process of absorption is arrested by the enamel, and the tooth, having lost the support of the fang, falls out, or is readily removed on the application of the slightest force. The removal of the fang is not always thus easily effected. Absorption may commence high up in the body of the fang, and not extending downwards as well as upwards, its action will be necessarily only partially effected, the advancing permanent tooth occupying the space left vacant by the decayed part of the fang, and putting a stop to the further action of the absorbents. In this event, the milk and permanent teeth, both being retained in the jaw, are more or less out of their proper place. Absorption of the fangs of the temporary molar teeth goes on in all of them simultaneously.

The irregularity with which the permanent teeth make their appearance, is considered by some writers to be as great as that attending the temporary teeth. Bell precedes the table giving the medium periods at

like the dead hair, while its fang, with its bony sheathing, and vascular and nervous pulp, degenerates, and is absorbed.

The degeneration is accompanied by some unknown spontaneous decomposition of the fang, for it could not be absorbed, unless it was first so changed as to be soluble. And it is degeneration, not death, which preceded its removal; for when a tooth-fang dies, as that of the second tooth does in old age, then it is not absorbed, but is cast out entire, as a dead part.—*Kirke's Handbook of Physiology.*

which they are cut, with the remark, that "so irregular are they in this respect, that comparatively little dependence can be placed upon such a statement;" *i.e.*, upon the table which has been copied into the preceding page, and which, it should be stated, refers only to the teeth in the lower jaw, which usually appear a few months earlier than those of the upper maxilla. Dr. Chapin Harris also remarks, that "the periods of the eruption of the adult (the permanent) teeth are, however, so variable, that it is impossible to state them with perfect accuracy. Sometimes the first permanent molars appear at four years, and the central incisors at five; at other times, these teeth do not appear before the ninth or tenth year."

Several of the more recent authors hold a different opinion. Owen says: "Both earlier and later periods of development of the permanent teeth have been observed and recorded; but such varieties rarely affect the general order of succession. I have described this order as it occurs in the lower jaw, the teeth of which usually appear earlier than the corresponding ones above. John Hunter, after indicating the first incisor and the first molar as the earliest of the adult teeth that are formed, rightly observes: "The teeth between these two points make a quicker progress than those behind."*

Mr. Saunders, some few years ago, published a pamphlet, entitled, "The Teeth, the Test of Age," in which he sought to show that the age of persons might be gathered from the regularity with which the per-

* "Odontography," p. 457.

manent teeth made their appearance above the gums. The object of his publication was to enable the surgeons connected with the factories to ascertain the respective ages of the children, whose services were offered by their parents, or were required by the managers. His investigations were made on the boys and girls belonging to some of the principal public schools in London, including Christ's Hospital, Blue-Coat School Westminster, the Foundling Hospital, Burlington School, City of London National Schools, &c. &c. The mouths of upwards of one thousand children were examined during these inquiries. They were therefore sufficiently extensive to authorise considerable stress being laid on the results. His inquiries were prompted, he states, by a passage in one of Mr. Horner's letters, on the subject of factory children, with reference to a criterion of their age. Mr. Horner says: "Some surgeons have laid great stress upon the development of the teeth as a safe guide; and if the object were the ascertaining of the *actual age** of the child, such a test would, perhaps, be less liable to error than that of height, but as an evidence of bodily strength it is obviously not to be depended upon."

The latter part of this paragraph is totally at variance

* M. Quetelet observes: "To show how little advancement has been made in the study of the progressive development of the human frame, if it were required to establish the age of an individual by the combined consideration of his physical qualities, we should not be able to find any scientific rules to guide our determination, but should be obliged to have recourse to the most unsatisfactory empiricism."—Saunders' "*The Teeth, the Test of Age.*"

with the doctrines we have sought to inculcate in the earlier pages of this work. So also is it not in accordance with the truths of physiology; the development of good, sound, healthy teeth, fully adapted for the performance of the duties for which they are destined, are an indication, and, more than an indication, they are a proof of unusual health and vigour of constitution. This, however, has already occupied so much of our time and space that we need not dwell upon it now. Suffice it to say, that the commencing portion of the paragraph quoted by us from Mr. Horner, induced Mr. Saunders to institute and carry out those investigations, the results of which we are now about to lay before our readers.

It must be remembered that the milk or temporary teeth consist of, or rather are twenty in number; that during the period extending from infancy to puberty, eight additional teeth are obtained; and the four which complete the number, thirty-two, are generally cut about the time when their owner comes of age. If the tables be referred to, in which the dates when the permanent teeth make their appearance above the gums are stated, it will be seen that, at certain fixed periods, the respective teeth mentioned therein are cut. On the fixity of these dates, denied by some writers, and strongly asserted by others, Mr. Saunders depends for making the teeth a test for age. He says:

“The second set of teeth, then, consisting of four classes—incisors, canine or cuspid, bicuspid, and molar—being developed in the order stated above” (see the tables of Bell and Chapin Harris), “the mouth will

present the following appearances during the entire process :—

Age.	Incisor.		Cuspid.	Bicuspid.		Molar.	
	Central.	Lateral.		Anterior.	Posterior.	Anterior.	Posterior.
Seven years .	.	..	..	..	..	4	..
Eight . .	4	..	..	..	..	4	..
Nine . .	4	4	..	..	..	4	..
Ten . .	4	4	..	4	..	4	..
Eleven . .	4	4	..	4	4	4	..
Twelve to twelve and a half .	{ 4	4	4	4	4	4	..
Twelve and a half to fourteen .		4	4	4	4	4	4

"This second, or permanent set, then, contains an additional eight teeth, making in all twenty-eight."

With reference to the table just cited, the jaws and teeth of upwards of one thousand children were examined. Without enumerating our pages with the tables of results, as found in the boys and girls of certain ages in the different schools, we may say, "that of seven hundred and eight children, of nine years of age, three hundred and eighty-nine would have been pronounced, on an application of this test, to be near the completion of their ninth year—that is, they presented the full development of that age. But on the principle" (stated by the author) "of reckoning the fourth tooth as present where the three are fully developed, a still larger majority will be obtained, and, instead of three hundred and eighty-nine, the proportion will be as follows:— Of seven hundred and eight children, no less a number

than five hundred and thirty will be fully nine years of age. What then are the deviations exhibited by the remaining one hundred and seventy-eight? They are the following:—One hundred and twenty-six would be pronounced eight years and six months, and the remaining fifty-two eight years of age; so that the extreme deviations are only twelve months, and these only in the inconsiderable proportion (when compared with the results obtained by other criteria) of fifty-two in seven hundred and eight.

“Again, of three hundred and thirty-eight children, of thirteen years of age, no less than two hundred and ninety-four might have been pronounced with confidence to be of that age. The remaining forty-four would have been considered as follow:—Thirty-six in their thirteenth, and eight near the completion of their twelfth year.”

From these statements, on which it is evident considerable time and attention were bestowed, and which have been worked out most elaborately, it would appear that, in by far the majority of cases, Nature brings forward the teeth of the permanent set at certain fixed periods, from which she varies comparatively rarely. Nevertheless, whether it be, as is most likely, from the constant and hard toil to which the parents are subjected throughout the whole of their wearisome lives, impairing the strength and vigour of their constitutions, aided also, and that materially, by their little ones being early subjected to the same health-destroying labour, the application of the test was not so successful, as the beautiful theory would have led one to anticipate; and we are inclined to believe that few surgeons con-

nected with factories now rely at all on the development of the teeth as a test of age.

Mr. Saunders' views on this subject are nevertheless supported by the most recent writers on dental physiology; but no new facts or statistical data have been adduced, to give them that additional support which experience has taught us they so pre-eminently require.

Some instances have been recorded in which there has been distinct evidence, leading to the belief that a third set of teeth has been cut. This is not generally admitted as a recognised fact, but it is not at all impossible, as deviations from the laws of nature are of constant occurrence, and there is no more reason why there should not be a third eruption of teeth, than there is for the irregular appearance of their temporary and permanent predecessors, or for there being a greater or less number of teeth cut in infancy or childhood than is usual. By those who doubt the possibility of such an occurrence, the explanation offered is, that the supposed third set consists of teeth of the second dentition, which, from want of room in the alveolar arch, lie hidden in the gums, until, from the advance of age, the teeth fall out, and the gums recede, when those previously concealed become exposed, and are mistaken for teeth of a third dentition. Bell states that he has known an instance in which four front teeth were produced in a female at the age of eighty, but he considers it questionable whether they were to be regarded as new formations, or as the retarded completion of certain of the second set. He says: "It would be difficult to imagine in what manner, or upon what known principle

of animal formation the rudiments of these teeth could have been spontaneously formed in the jaw of an old person, as we find that the first set of teeth, which alone can be considered as original and independent in their mode of production, are only formed simultaneously with the original organisation of the other animal structures, and that the second set derive their existence essentially from the former." The question after all, although perhaps of some interest in a physiological point of view, is practically unimportant. Such instances, when they do occur, may be ranked among the *cas rares*. The teeth, when cut, for want of a sufficient socket for protection and support, are a source of annoyance and pain, are always loose and useless, and generally necessitate an operation for their extraction.

Dr. Mason Good, in his "Study of Medicine," states that the cutting of a third set of teeth more commonly takes place, when it does occur, between the sixty-third and eighty-first years, or the interval which fills up the two grand climacteric years of the Greek physiologists, at which period the constitution appears occasionally to make an effort to repair other defects, beside those of lost teeth. Dr. Bisset, of Knayton, relates a case in which the patient, a female in her ninety-eighth year, cut twelve molar teeth, mostly in the lower jaw, four of which were thrown out soon afterwards, while the rest at the time of examination were found more or less loose. John Hunter is said once to have witnessed the reproduction of a complete set of teeth at the third dentition, together apparently with their sockets. A similar case is mentioned in the "Edinburgh Medical Commentaries." The teeth were cut with extreme pain

and difficulty. The patient was in his sixty-first year.

Another irregularity is the occasional, but not uncommon appearance of supernumerary teeth,—that is, of a larger number than thirty-two. When they are met with, it is generally in the upper jaw, and their form is most usually conical, with a single fang. Their shape is, however, very irregular and unsightly. Bell has, however, seen five incisors, all well formed, and perfectly regular, in the lower jaw. There were not any indications by which the supernumerary tooth could be distinguished. At the back of the mouth, they in some degree resemble an inferior, imperfect bicuspid.

The inconveniences attending the existence of a supernumerary tooth are often considerable; they cause more or less deformity in the position and direction of the teeth whose place they usurp, or near which they make their eruption, and as, until the whole of the crown of the adventitious tooth has perfected itself externally, so as to afford a grasping surface at its neck, its extraction is nearly, if not quite impossible, the deformity may become permanent, or at least continue for a considerable time, and mechanical assistance will be required to restore the displaced teeth to their proper position, after the supernumerary tooth has been removed. On this matter we shall dwell somewhat more at length in another part of the work. When the supernumerary tooth is projected through the palate, it causes by its presence considerable irritation of the tongue, and sometimes even a defect or impediment of speech from the efforts of the sufferer, while involuntarily seeking to avoid bringing the tongue in contact with the irritating tooth. This defect may continue for some time after the offending

tooth has been extracted, as the habit of defective speaking, when it has been continued for some time, is conquered with great difficulty.

Chapin Harris asserts that these adventitious teeth possess a peculiarity for which it may seem difficult to account: although they are generally imperfect in their formation, yet they are much less liable than the natural teeth to decay. This, however, he says, is to be attributed to the fact that they possess a lower degree of vitality, are much harder, and consequently not so susceptible to the action of its usual causes.

In his concluding remarks on the occurrence of irregularities among the permanent teeth, Bell mentions a singular maldirection of a tooth. He says: "Occasional remarkable deviations take place in the situation and direction of the teeth, independent of any of the usual causes of irregularity. These, however, are so entirely anomalous, that there can be no practical utility in entering into a detail of them, nor do they appear to possess any interest in a physiological point of view. Amongst the most curious of these deviations, is one which forms the subject of a drawing in my" (his) "possession, in which a cuspidatus, or a supernumerary tooth resembling it, has taken a reversed direction, and appears with its crown directed upwards, projecting into the right nostril to the extent of three-quarters of an inch. I am informed by Mr. Smith, surgeon to the Infirmary at Bristol, that the drawing was made from a subject in the possession of that gentleman's father, and presented by him to Mr. Cline."

Osseous union between the teeth at their roots and sides, and even between the crowns, is of occasional, but

comparatively rare occurrence. Fox collected several specimens of this union between the fangs of teeth, which are deposited in the Museum at Guy's Hospital. Bell and Fox speak of it only as regards the roots and sides of the teeth ; and the former refers it to the original union of the two pulps prior to calcification, or when, as in the case of union between a bicuspid and a molar, the pulps are not strictly contemporary, to a fusion of the fangs during ossification. Other writers speak also of the union of the crowns. Chapin Harris was consulted by a gentleman, on examining whose mouth he discovered that the crowns of the central incisors of the upper jaw were perfectly united, their posterior surfaces presenting the appearance of one broad tooth ; while their anterior, or labial faces, had the same semblance as the like sort of teeth usually have. In another case, he found the anterior surfaces of the right central, and lateral incisors of the lower jaw united in a similar manner, while the posterior phases of the same teeth were entirely unconnected. Dr. Koecker denies the existence of this union, or fusion between the teeth, but the evidence in favour of its occasional occurrence is too strong to be disputed. A case was recorded some years ago, in one of the medical journals, of complete union between all the teeth,—in fact, they seemed as if they had been cut out of one block. This, of course, is quite apocryphal.

When bony union exists between the fangs of two teeth, it must be evident that it will offer considerable impediment to the extraction of either, in case disease should render that operation requisite. Either the tooth to be extracted must be broken, or the tooth united with

it must be also removed. There is not, unfortunately, any means by which the existence of this osseous union can be predicted before the attempt at extraction is made ; but the number of specimens now in existence in different museums fully attest its occasional occurrence. Disease may lend its aid to effect this unpleasant complication, the fangs of teeth being sometimes connected together by exostosis, a diseased bony growth arising from one or other, or both, of the united teeth.

There are other irregularities to which the permanent teeth are subject, with respect to their size, shape, and direction, to which we will not at present refer, as they will come more particularly under notice in a subsequent chapter, when they will be more fully treated of, in connexion with their treatment.

The disorders incidental to teething during the primary dentition, when the milk, or temporary set of teeth make their appearance above the gums with pain and difficulty, and severe irritation and inflammation, have been already fully spoken of, and several serious maladies alluded to, with cases in illustration, tending to show the frightful danger which awaits the infants of those who are neglectful of this important epoch of infantile life. Hitherto, in works treating of the teeth, their diseases, and preservation, and also in the majority of books written to describe the various ills to which suffering humanity is liable, but little, if anything, has been said respecting the maladies which may be induced by the irritation of teething during childhood. It has been taken for granted, apparently, that no further ill awaits the child than the mere pain and local inflammation which must always attend this pro-

cess to a greater or less degree, whether it be in infancy, childhood, or old age. And yet, if the history of many of the maladies, particularly of the skin diseases, and more especially of those of the scalp, were adequately, and correctly traced to their source, not a few, perhaps, would be discovered to have for their predisposing cause the irritation attendant on the teething of the second dentition. In infancy, certainly the nervous system is more readily excited than during childhood, and brain, and other affections of that apparatus, and also of those which are—and what part of the human economy is not?—under its immediate influence, are induced with a fearful rapidity and severity of character, not witnessed at any other period of life. But does it follow, because there is a less tendency to nervous excitability, that therefore it does not at all exist? Let it be remembered that the first teeth of the permanent set are cut, generally speaking, between the fifth and seventh years, and that that is a time of life when the nervous apparatus is in its fullest power of excitability. Year after year, as it passes away, witnesses the recurrence of the phenomena of dentition up to the fourteenth year, or the period when the child assumes the manly or womanly character. Then new desires, new feelings, and new irritations are set up in the system. Can it then be expected that, while modifications of this nature are going on in the human frame, while the nervous and circulating apparatus are hourly called upon to supply stimulus and a sustaining power to enable the system to maintain itself under all these changing conditions, an irritation of so peculiar a kind, involving a nervous excitement, a determin-

ation of blood to parts so vicinal to the brain, and irritation and inflammation of some degree of severity, affecting not infrequently not the gums only, but the mucous membrane of the mouth and cheeks, and sometimes of the throat, can exist without inducing in subjects of a peculiar, perhaps of an unhealthy, condition of system, states of disease more or less marked, and more or less dangerous, according to the condition of the bodily health and habits, diet, and other causes which sanatory investigations have already shown to have a great influence on health and disease ?

There are many diseases of childhood, the origin of which is exceedingly obscure. Conditions of system, the reverse of healthy, are met with ; strumous, cachectic, ricketty children are found in all large towns, the victims of bad and insufficient food, of deficient ventilation, of want of cleanliness, of hard and long-protracted labour, of irregularities in the hours of rest, and of general disorder. In these unhappy examples of the bad consequences of deviations from Nature's laws, and in others, in the higher classes, to whom delicacy of frame and impaired health may be transmitted from their parents, or may be induced by any or all of the various causes which act upon and derange the wondrous fabric called MAN, and in deranging, disorder the beautiful operations of the machinery of which he is composed ; and again also in those stout, ruddy, full-blooded, healthy-looking children, to whom Nature seems to have imparted a double share of health, strength and vigour, the irritation of the second dentition may, by localising the disorder, be ready at any moment to fasten on their frames, and light up disease in the head,

chest, abdomen, or skin, which, accordingly as its predisposing and exciting causes are recognised or mistaken, may be subdued in time, or may remain to prey upon the vitals of the sufferer, and even to induce disease which may be ultimately fatal.

The cutting of the wisdom-teeth is frequently attended with severe suffering, and is as often very protracted. It has been already stated that this, the third molar, is not cut until about the twenty-first year. Between the eighteenth and the twenty-first years is the period when this tooth generally induces all the local symptoms attendant on primary dentition, but it not unfrequently happens that it does not make its appearance until very much later in life. All the signs of intense local inflammation are generally present, and very often also there exists so much irritation of the system as to light up fever, with great thirst, irritability and restlessness, and occasionally even delirium, rendering it absolutely necessary to call in medical assistance. The extreme amount of local and general irritation which is so often caused by the dentition of the third molar tooth during adult life, tends to confirm the opinion already expressed, that during the dentition of the other teeth of the permanent set in childhood, there may be, in at least some instances—for it is not by any means intended to imply that it is a constant occurrence—such a degree of irritation and inflammation, as to endanger the outbreak of some disease by its localisation. It can hardly be credited that so much danger should so frequently attend dentition in infancy, and so much suffering wait upon the cutting of the wisdom-teeth at the period of life when Nature

causes them to make their appearance ; and yet that the middle period, that of childhood, when there are so many causes ready to aid and increase the inflammatory or diseased actions in the human frame, should escape altogether unseathed by the protrusion of larger and stronger teeth than those of infancy, occurring from year to year until the predestined number is completed.

Experience has shown that this is not the case. Although it would be almost a vain task to search the mediæval records for cases of disease, induced during the second dentition, and dependent on it for its predisposing or exciting cause, nevertheless the proof that disease may be so engendered, is not altogether wanting. I have been enabled, through the kindness of professional friends, to trace several instances of cutaneous diseases affecting the scalp to this cause ; the history in these cases clearly showed the origin of the malady, and its connection with the irritation of dentition was as fully demonstrated by the relief and success attending the employment of remedial measures calculated to lower irritation and inflammation, more especially the local inflammation of the mouth and gums which accompanies dentition. In children predisposed to St. Vitus' dance, to epilepsy, and to many other disorders of the nervous system, the considerations already spoken of should induce parents to be especially cautious and watchful during this period of their life ; for there can be but little doubt that the irritation consequent on even the second dentition, as they are already greatly predisposed to the outbreak of nervous disorders, may excite and fan into a flame the embers of serious disorders. It is far from improbable that some

of the confirmed cases of epilepsy and of St. Vitus' danee owe much of their aggravation to the cutting of the permanent set of teeth. As much, or nearly as much care is required at that important and interesting period of life as during infancy; and the same preventive and remedial operation is as beneficial in the one as in the other. No matter at what period of life dentition excites inflammatory action, or causes disorder of the general health; when it does, in addition or prior to, all other remedial measures, **LANCING THE GUMS** should never be neglected.

CHAPTER V.

HAVING in the preceding chapters given a sketch of the origin, situation, progressive development and eruption of the teeth, and having also pointed out the serious consequences that sometimes attend dentition in childhood, at the adult period of life, and even in middle or old age, when the wisdom-teeth are then cut, or when that more strange and anomalous phenomenon occurs, the dentition of a third set of teeth, the next subject for consideration will be caries or decay, the principal disease affecting these organs.

That peculiar condition of the teeth, generally called caries or decay, but by some distinguished members of the dental profession, gangrene or mortification, is still a matter of doubt and discussion. Some writers, who consider the teeth as utterly devoid of organisation, are of opinion that they are consequently insusceptible of disease, properly so-called, and that caries or decay can only be induced in them by the chemical influence of a disordered, unnatural condition of the fluids of the

mouth. Others, again, assimilating in their minds the peculiar structure of the teeth with that of bone, regard the diseased states of both as alike, and set aside altogether the minor points of distinction between them. On this point Bell observes very justly, that "although from the identity of structure in the teeth and in the bones, they are obnoxious to similar causes of disease, yet the phenomena which the teeth present in disease, are so modified by the lower grade of their organisation, and the less active condition of their living powers, as in many cases, to exhibit characters essentially different from those which belong to the analogous diseases as occurring in the bones."

Bell is one of those writers who call the decay of a tooth gangrene, and he defines it as being "mortification of any part of a tooth, producing gradual decomposition of its substance," the proximate cause being, according to him, inflammation, no matter how produced; the part that suffers most severely being from its low degree of vitality unable to recover, mortification or gangrene is the result. To prove this, he adds, "a tooth which has been the subject of inflammation will often remain without any diseased appearance for weeks and months afterwards, but at length the consequences become obvious by the occurrence of a darkened spot, which shows itself through the enamel, and the gradual destruction of the tooth follows, if means be not taken to arrest its progress. I have known a case in which inflammation had taken place through all the molars of one side, both above and below; and, notwithstanding it was speedily subdued by leeches, &c., yet within a year afterwards, scarcely any of the teeth so

affected had escaped the attacks of gangrene, although the corresponding teeth on the other side remained free from disease." As a natural consequence of this doctrine, Bell is of opinion that decay commences internally, while those who refer it solely to the chemical action of the fluids of the mouth, consider that in every case decay begins externally, and gradually destroying the structures beneath, works out a cavity in the tooth, and finally lays bare the pulp.

We have neither the space nor the inclination to examine minutely into the different theories relative to the causation of decay, nor into the arguments by which those we have mentioned are supported and defended, or controverted. We must content ourselves with averring, that those who would refer any one disease, however simple it may be in its characters and results, to any one special cause, are in error. Man in a state of civilisation is subjected to so many influences creative of disease, that no one of them can or ought to be regarded, as solely operative in inducing a change from the natural condition of a part. So is it with the teeth. The causes productive of decay are numerous and powerful; some depend on the state of the constitution, hereditary, congenital or acquired, and others again are entirely local in their origin and action.

All dentists are agreed, we believe, in asserting that the peculiar characters of the teeth are transmitted from parent to offspring. If those of the parent be strong, sound, and well-formed, similar teeth may be looked for in the child, unless it be suffering from continued ill-health. Peculiarities in color and position are also transmitted, and more especially the ten-

deney to decay. It is said, however, that sometimes the peculiar condition of the teeth may be escaped by one generation to re-appear in the next, as is also the case with a more serious and more fearful malady—insanity. We find many diseases termed hereditary, which are clearly dependent on peculiar conditions of formation, and as clearly transmitted from parent to child. The number of diseases which may be thus ranked is very great, and affect almost every part of the frame. Such irrefragable evidence has been brought forward in proof of their occurrence, that it would be impossible to entertain a doubt on the subject; yet, many of those who will readily yield their belief to the transmissibility of the more serious and important diseases of the principal organs of the body, will entertain more than a doubt of the transmission from parent to child of a tendency to decay in the teeth. Nevertheless the evidence on this point is very clear, and the same arguments apply, as in the case of the more severe diseases. Children resemble their parents in their external configuration; and there can be no rational cause to doubt that the resemblance is continued internally: that is to say, that the same peculiarities of strength and decay present in the parent will also be found in the child. If this be true of the frame generally, it must be equally true of a part of the frame, and so it is found to be. The teeth in many instances in the child, but not in all, partake of the characters of those of the parents, and decidedly so when they present a marked resemblance to them in shape, size, position, and other external signs. Chapin Harris says, “The teeth of the child being shaped like those of the parent,

possessed of a like degree of density, and in most instances similarly arranged, are equally liable to disease; and when exposed to the action of the same causes, are affected in a like manner, and generally at about the same period of life." To this remark he appends the following interesting question: "Such being the fact, is it unreasonable to conclude that judicious and early attention may so influence the formation and arrangement of the teeth, that their liability to disease may be greatly diminished?"

Speaking of the predisposing causes, Bell says, hereditary predisposition is among the most common and remarkable. It often happens that this tendency exists in either the whole or greater part of a family of children, where one of the parents had been similarly affected. This, he adds, is true to so great an extent, that he has very commonly seen the same tooth, and even the same part of a tooth, affected in several individuals of the family, and at about the same age.

Saunders ("Advice on the Care of the Teeth," p. 52) says:—"Cases are occasionally met with, and they are among the most intractable which the dentist has to encounter, and not unfrequently baffle his utmost skill, in which disease appears in the same part of the same tooth, at a similar period of life, in all the individuals of a family who resemble the parent in whom the defect originally existed. A remarkable case of this kind has occurred in my own practice, in which four of seven individuals of one family, all bearing a striking resemblance to each other, have the lateral incisor (the outermost of the four front teeth) on the right side in

a more or less advanced state of decay. The disease makes its appearance at the adult age in the same spot, and although different treatment has been sought for each, they seem all about to share the same fate."

With respect to the congenital causes of decay, we have imperfections in the formation of the different portions of the teeth, such as an unnatural thinness of enamel, the imperfect junction of the *fasciae* of enamel-fibres, principally in the fissures of the crowns of teeth, where consequently portions of food resting and decomposing may set up disease and induce decay. The cavities in the enamel and dentine, already spoken of in the earlier chapters, also tend to favour the occurrence and progress of decay; and it may be through some or other of these imperfections, that the hereditary transmission of decay occurs. Persons of a weakly, delicate, ricketty or strumous habit of body, are more liable to decay of the teeth, and that at an early period of life, than are the healthy, the strong, and the robust.

Among the singular facts connected with the occurrence of decay in the teeth, there is one respecting which it may be advisable to say a few words. Dr. Budd, of Bristol, and Mr. Paget, have both published papers "On the Symmetry of Diseases," of which Mr. Paget, in his lectures, says: "The uniform character of them all is, that a certain morbid change of structure on one side of the body is repeated in the exactly corresponding part of the other side." He exhibited, in illustration of this remark, a lion's pelvis, in which, multiform as the pattern is in which the new bone, the product of some disease comparable with a human rheumatism, is deposited—a pattern more complex and

irregular than the spots on a map—there is not one spot or line on one side which is not represented, exactly as it would be in a mirror, on the other. The imitation is accomplished with daguerreotype exactness.

The symmetry of disease is strongly shown in the decay of teeth, so much so as to have become a common subject of observation—an old wife's tale—that when one tooth becomes decayed, its fellow on the opposite side soon becomes, in its turn, the seat of the same disease. It rarely happens that the first molar teeth of the permanent set remains long in a sound condition. From some cause or other they are soon affected with decay; and when one of them becomes diseased, the corresponding tooth in the same jaw follows, and afterwards the same set in the other jaw. So also is it with the other teeth, although perhaps in them this peculiar character—the symmetry of disease—is not quite so well marked.

The cause of this peculiar affinity for disease in certain parts of the system does not admit of a ready explanation. Mr. Paget seems inclined to refer it to a diseased condition of the blood, but that view of the matter is hardly applicable to the symmetry of decay in the teeth. These organs have but little blood circulating in them; and it is certain that in many cases caries is caused, not by a vital or inflammatory action of the part diseased, but by the chemical influence of the vitiated fluids of the mouth, aided by the decomposition of particles of food in the fissures and interstices of the teeth. When then we find a tooth the seat of decay, and the same disease commences in the corresponding tooth in the same place, in the opposite jaw,

we are forced to the conclusion—as the only one that can be arrived at in the present state of our knowledge—“That these are the only two pieces that are exactly alike; there was less affinity between the morbid material and the osseous tissue, or (in the case of other diseases) the skin, or the cartilage close by, else it would have been also similarly diseased.”*

The effects of ill-health and of positive disease on the teeth during the period of their formation are often well-marked. Many persons exhibit on the anterior aspect of their teeth a fissure or groove; and whenever this is seen, it may be regarded as an indication that the possessor of the teeth has suffered severely from disease during infancy, which at the time inflicted such a shock in the system as to arrest or interrupt the process of formation, even in the teeth. The deficiency then caused is never replaced, and may in itself prove an adjuvant to decay, the structure of the teeth being in consequence less healthy and perfect, and therefore less able to resist the immediate causes of disease. A corresponding effect takes place in vegetation. By examining a tree that has been felled, it is generally easy to ascertain in what particular year it had suffered from frost; for the layers of wood formed in such years will appear withered and shrunk, and particularly hardened.

Nor are the teeth the only parts of the human frame which will indicate by their appearance the previous occurrence of severe disease. Mr. Erasmus Wilson, in his clever little work on “Healthy Skin,” quotes the following paragraph from Dr. Beau on this subject;

* Paget’s Lectures, in the “Medical Gazette.”

he says : " That the nails are affected by illness, and that the materials of growth are supplied by the blood in diminished quantity. Hence the portion of nail formed during the progress of disease will be perceptibly thinner than that produced during health, and may be distinguished on the surface as a transverse groove. If the disease have been sudden, the outer boundary of the groove will be abrupt, and *vice versa*; and if the disease be one in which the nutritive functions are seriously affected, the depth of the groove will maintain an exact correspondence." Mr. Wilson adds :

" Dr. Beau's theory certainly accords with the known operations of the laws of physiology, and obtains an important corroboration from another appendage of the surface membrane of the body, namely, the teeth. The deep and uneven transverse furrows which are frequently observed on the teeth are referable to infantile disease, and each notch is a sad and too faithful record of a period of suffering and pain."

Among the acquired causes may be numbered long-continued indigestion, bad and mal-assimilated or undigested food, the effects of mercury given repeatedly or over a long period of time, its peculiar actions on the system being either kept up the whole time or occasionally re-excited, and the exhibition of medicines containing mineral acids, without the precautions necessary to prevent the influence of the acid on the teeth, such as washing out the mouth with an alkaline solution immediately after taking the dose. The local causes productive of decay, are chiefly referred by those who contend for its chemical origin, to vitiated saliva, the putrescent or decomposing remains of particles of food

lodged between the teeth, or in their interstices, acids, and a corrupted state of the fluids conveyed to these organs for their nourishment. Mechanical injuries, extreme heat, cold or sudden transitions of temperature, are also properly regarded as causes of decay. Among the mechanical injuries may be enumerated the subjecting the teeth to violent and unnatural action and uses, such as cracking nuts, or biting hard substances, employing them as a vice or forceps, to loosen a screw, the breaking of threads, as practised by some ladies when sewing, &c., the suddenly encountering a small bone in the food, or a shot in game, &c.* By another class of writers, inflammation of the tooth itself is looked upon as the principal cause of its gangrene. Particular kinds of diet, and luxurious habits of living, have a decidedly injurious tendency on the teeth.

Chapin Harris, anxious to prove the chemical origin of decay, says, the existence of an acid in the mouth, capable of decomposing the teeth has been conclusively proved by Dr. Mitchell; and the fact may be ascertained by moistening a piece of paper, dyed blue with turnsole, with the fluids of the cavity obtained from between the teeth, where they have been retained until they have become vitiated. It will assume a red tinge. The acid detected by Dr. Mitchell was the septic; but the acetic, lactic, oxalic, muriatic, and uric have also been discovered in the saliva in certain states of health. The saliva, when healthy, is alkaline, but certain disorders of the system render it acid; and in this state, Harris says, it must exert a deleterious action on the

* Saunders' "Advice," &c.

teeth, by decomposing and breaking down their ealcarcous molecules, or in other words, causing their decay.

Among the indirect causes of decay, the following may be enumerated :—deposition of tartar upon the teeth; artificial teeth improperly applied, or of bad materials; roots of teeth; irregularity in the arrangement of the teeth; too great a pressure of the teeth against each other; and, in short, everything that is productive of irritation to the alveolar and dental membranes and gums.

Decay generally eommences, in all probability, on the external surface of the teeth. Those authors who refer its occurrence solely to the chemical influence of vitiated fluids, &c., state that it may be said to proeceed invariably from the surface towards the centre; while, on the other hand, those who consider inflammation as the primary cause, are of opinion that the gangrene begins in the interior of the tooth, and makes its way through the dentine and enamel externally. My own experience would lead me to believe that neither of these classes of writers is quite correct, for I have met with many cases in which decay has commenced externally, and others in which it had evidently an internal origin, and had made much progress before it gave evidence of its existence by undermining the enamel. I am therefore of opinion that caries may commence either externally or internally, according as it originates in chemical or mechanical causes, or in constitutional defects or inflammation.

The progress of decay in a tooth is generally very slow and insidious. As until the pulp and nervelets are

exposed, it is rarely, if ever, attended with pain, it may have, and generally has, committed considerable ravages before its existence is discovered. There is, however sometimes a certain degree of uneasiness in the affected tooth, even early in the disease, but which does not amount to pain, and indeed is generally so very slight as not to attract sufficient attention to ensure its being remembered by the patient, when, the disease having made considerable progress, the assistance of the dentist is sought. This sensation of uneasiness is not permanent, and may continue for a short time only, but it recurs from time to time, and ultimately the indications of decay will be found in the part of the tooth where the sensation was experienced. The immunity from pain is not always met with. Some teeth are very painful, almost from the beginning; and any considerable deviation from the ordinary temperature of fluids taken into the mouth is at once rendered perceptible to the sufferer by the agony it causes.

The first sign that shows the occurrence of decay in a tooth is discoloration of a part, generally near the neck, but, especially in the molar teeth, frequently in the crown, where the fissures occur from the imperfection of the enamel fibres, and in which particles of the food so frequently lodge. The crowns and sides of the teeth are the parts more liable to decay in early life; and the necks in old age. The discoloration is usually of a very dark hue, amounting sometimes even to blackness; but it may exhibit almost any shade.

Slowly but steadily the disease makes way, the change of color becomes more extensive, and after a time of more or less duration the enamel yields, and a

cavity is formed in the tooth, the dentine being absorbed either prior or subsequent to the loss of the enamel. The result may be either the total decay of the crown, the fangs, which have a larger share of vitality, remaining intact; or again, nature may throw an intervening wall of condensed dentine between the disease and the pulp, or the caries may continue to advance, gradually destroying all before it, and finally exposing the pulp and the nerves; then, if not previously, giving rise to toothache.

The temporary teeth are liable to decay and necrosis, or death of the whole tooth, even as are those of the permanent or second set. The examination of the mouths of children under seven years of age, will frequently disclose a sad state of these important organs, if they have been previously unattended to by the dentist. Although the incisors and canine teeth, as is usually the case, may have escaped, and are perfectly sound, the molars will be frequently found much decayed, and in many instances the crowns will be completely destroyed. It is of the utmost importance, therefore, that the teeth of children should be looked to from time to time, as, if allowed to decay unchecked, and an ignorant person be permitted to tamper with them, he will in all probability have recourse to extraction, instead of seeking to prevent further mischief, and relieve that already existing; and thus will lay the foundation for a contracted jaw, irregularity of the permanent teeth, and their premature destruction.

When the dental pulp and the nerve of the tooth have become the seat of inflammation through the continued progress that decay has made causing their

exposure, by the removal of their previously existing coats of armour, the tooth becomes the seat of the most raeking, the most agonising pain. Few are there who have not, at one or other period of life, suffered from the effects of this dreadful pain, and those only who have endured it can form an idea of the suffering and misery it causes. The sleepless nights, the fever of the body, the restlessness and irritability it sets up, must be experienced, to be imaged to the mind.

To relieve this severe pain a variety of remedies, anodyne, stimulant and destructive, have been recommended. It would fill many pages of a much larger work than this is intended to be, to deseribe all these boasted eures for toothache. A few may, however, be alluded to. M. Ebrard advises a fifth of a grain of the muriate of morphia to be taken up with a wetted finger, and gently rubbed for a few minutes over the painful gum. The patient is to retain the saliva for ten minutes or so in contact with the gum, by leaning the head on that side, and then to swallow it. The remedy is to be repeated in two hours, unless the tooth-aehe has disappeared in the meanwhile. Laudanum, solid opium, spirits of camphor, ereosote, and the essential oils of thyme, rosemary, cloves, &c., have also been strongly recommended, and have, each in its turn, been successful in some eases, and failed in others. Creosote is especially injurious, on aeeount of its stimulant and escharotic properties, and because it frequently contains a proportion of acid. It endangers the other teeth. Similar danger is incurred when the stimulant oils are used. Dr. Stanelli stated some time baek in the "Annali Universali di Medicina,"

that chloride of zinc, liquefied by exposure to the air, possesses the property of removing toothache. His mode of application is most simple: by means of a hair pencil a small quantity of the chloride is applied to the cavity in the decayed tooth, and the pain, however severe it may be, is speedily relieved. Before using the salt, however, it is indispensable carefully to surround the tooth with cotton wadding, and then to fill the cavity with the cotton. The mouth is afterwards to be washed out with warm water. Stanelli says he has employed the chloride in very many cases, and never found the progress of the caries accelerated by it. Mr. Druitt advises cleansing the mouth with a solution of carbonate of soda, and then passing a bit of wool, wetted with a solution of a scruple of tannin, and five grains of mastie in two drachms of ether, into the decayed tooth. The gums are to be lanced or scarified prior to using the solution of tannin. The pellitory of Spain has also been found of use occasionally. The root of the pellitory is masticated, so that the juices it contains become mingled with the saliva, and are thus brought into contact with the diseased tooth. The pellitory is a powerful excitant of the salivary secretion. Paul, of Egina, recommends to the eaten part of the tooth to apply storax with opium or galbanum, or to let the patient inhale the steam from the seeds of henbane through a small funnel.* This latter remedy is of frequent use in Wales; and I have often found it prove

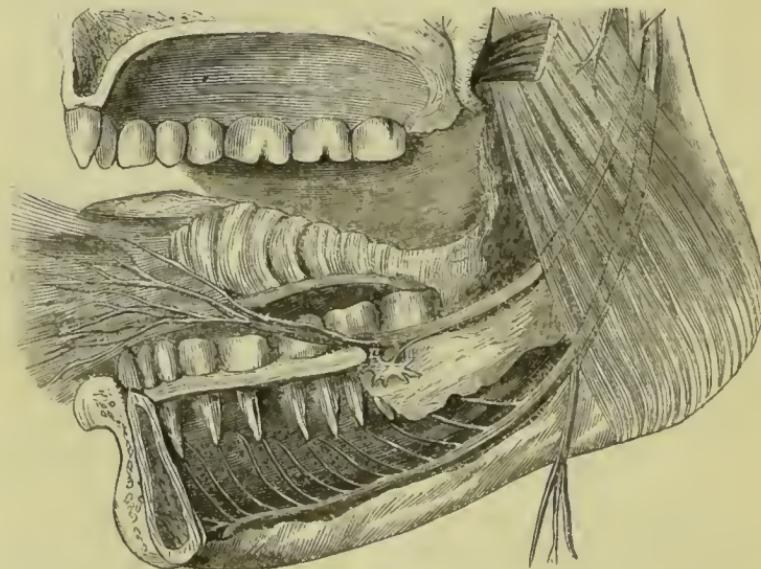
* Adams' translation, Vol. I., p. 451, published by the Sydenham Society.

very successful, even in bad cases, that is for the time being. Among the caustics, the one most urgently advised is, or rather was, nitric acid or aqua-fortis. The late Dr. Ryan, some years since, commended in strong language the application of this acid to the interior of the decayed tooth which caused the suffering. It proved serviceable for a while, but the great care requisite in using it, to avoid touching any of the neighbouring soft parts, and the risk of injuring or destroying the enamel of the other teeth by its chemical action, soon caused it to fall into disrepute. A piece of wire, or a slender metal rod, heated to a white heat, has in some cases cured the severe agonising pain attending the exposure of the nerve and dental pulp. It must be evident that the former applications afford relief solely by their sedative influence, and consequently that the pain may return when that influence has worn off, or when the sufferer has been again exposed to causes which may light up inflammation in the internal delicate living structures of the tooth, and that the latter act by destroying those structures more or less completely. If they be thoroughly destroyed either by the caustic acid, or by the actual cautery, the tooth dies, and becomes a foreign body in the jaw, in the which state it may remain for years without exciting irritation; or violent inflammation, extending to all the vicinal structures, with extensive suppuration and disease, may follow, rendering its extraction absolutely imperative, or nature may cause its expulsion by filling up the sockets, thus driving out the fangs partly by the deposition of adventitious matter in their containing cavities, and partly by their lateral contraction.

One only of all the remedies for toothache, that recommended by Mr. Druitt, is based on true surgical principles. Sedatives will relieve the pain, but cannot cure the disease; while the other remedies only cure it as a surgeon cures a bad leg by amputation. Toothache is caused by inflammation affecting the exposed dental pulp and nerves, and should be treated on the same plan that is employed to remove inflammation in other parts of the body. It is set up in the pulp from exposure to cold, or the direct mechanical or chemical injury inflicted by the presence of foreign matters in the cavity, such as particles of food, seeds or stones of fruit, the vitiated secretions of the mouth, and other such causes. To cure it, the cavity formed by decay should be carefully cleansed, and all extraneous substances removed. If the pain be very severe, a piece of wool soaked in a sedative liquid may next be inserted into it, and the inflammation subdued by the application of leeches, by freely lancing the gums, the administration of purgatives, and by friction on the face and jaw externally with a camphorated and anodyne emulsion. By these means, if properly carried out, the inflammation will be subdued, and then, when the tooth is in a quiescent state, the dentist will be able to ascertain whether it is in a condition to be stopped, and what kind of stopping is best adapted to it, or whether it will be necessary instead to extract the tooth.

The explanation why the suffering in toothache is so exceedingly severe, is both ready and clear. It has been already said in the earlier chapters of this book, that the arterics and nerves supplying the teeth, enter at a small opening in the apex of the fang, and pass through

a slender canal, into the body of the tooth, where they are distributed over the dental pulp. The exposure of this structure by decay leads to inflammation, if it did not previously exist. The symptoms of inflammation are pain, heat, redness, and swelling. Here then we have pain as a sign of inflammation; but the suffering is so intense, so utterly disproportionate to the amount of inflammation, that we must look to some other cause to explain it. This we find in the swelling, which is another of the symptoms. If it be remembered that the inflamed and swollen nerve is closely confined and compressed within a bony cavity and a narrow canal, the reason why the pain is so exceedingly acute will be at once obvious. The annexed engraving will aid in rendering this explanation more clear, as it shows the distribution of the dental nerves, and their entrance into the fang at the orifice in its apex.



When, as is sometimes the case, the attack of tooth-ache is symptomatic, or merely indicative of a dis-

ordered condition of other organs, of the stomach or the nerves principally, the advice of a medical man should be sought at once, as by speedy attention to the causes of the pain it may be readily alleviated and removed; but if it be allowed to become permanent, and to create a habit of disease in the system, it will be exceedingly difficult to effect a cure, more especially in cases of neuralgia or *tic douloureux*. It is a well-known fact in medicine, that when a habit of disease has been induced, it is not to be eradicated but with extreme difficulty; the cause may be removed, but the effects are often persistent long afterwards. The sooner in these cases, therefore, that medical assistance is sought, the more readily will the cause of the suffering be removed, and the chain of diseased habit broken.

Robinson, in his work on the teeth (p. 101), recommends extraction, in the sympathetic toothache occurring during pregnancy, if the tooth be decayed, a proposal by no means to be followed, for reasons already alleged. He seems indeed to think the recommendation not very defensible, for he says afterwards:—"But care is requisite here to judge correctly, for pain from teeth thus affected may generally be removed by appropriate means. Moreover, we have known hundreds of cases in which tooth after tooth was removed without affording relief; and it was only when the teeth of the patient, and the reputation of the practitioner, were (had been) sacrificed, that the real cause of the disease was rightly suspected to be, not in the mouth, but in the general state of the system." No tooth should be extracted during pregnancy without the sanction of the medical attendant of the patient.

The molar teeth are more liable to decay than are any of the others, and of these the first molars are the most subject to this disease. The wisdom teeth are sometimes protruded above the gum, already considerably impaired by the progress caries has made. Next to the molars rank the bicuspids in the order of liability, and to them follow the lateral incisors, and the canine, and last of all the central incisors. The first molar teeth show a tendency to decay, in the proportion of 96 per cent, while the proportion of the central incisors, according to the tables drawn up by Mr. Tomes, from cases at the Middlesex Hospital, is about $33\frac{1}{2}$ per cent. The same tables show that decay is the cause of the extraction of teeth in $88\frac{3}{4}$ per cent. They also serve to prove that the teeth on the right side have a slightly greater tendency to decay than have those on the left, and further that the teeth of the male sex are more liable to it than are those of women.

When decay has been allowed to proceed, without any measure being adopted to check it, and the tooth is not extracted, it may induce a larger amount of disease than the mere decay of the tooth. It may cause as local diseases, abscess in the alveolar cavity, and perhaps a fistulous opening through the bone and gum, inflammation of the periosteum, extending perhaps to the jaw itself, and even causing the death of a larger or smaller portion thereof, inflammation, abscess, and a fistulous ulcer of the cheek, a diseased condition of the gum, with tumors, or fleshy growths springing from them, exostoses, or bony tumors from the fangs or jaw, inflammation and abscess in the sockets connected with the fangs of the decayed tooth, &c. The

constitutional disorders that may be thus set up, are numerous and varied. They have been already mentioned, but some of them may be again cursorily alluded to. Among the principal of these we have neuralgia, or tic douloureux of a neighbouring or of a distant nerve, inflammation of the eyes, palsy of the retina, or nerve of sight, inflammation of the ear, and deafness, general ill-health, indigestion, a disordered state of the stomach and bowels, anomalous pains in different parts of the body, the probable occurrence of miscarriage or abortion during pregnancy, especially if the offending tooth should be extracted during the gestation or child-bearing—an operation that should rarely be performed under such circumstances. There are also other disorders that result from the long prevalence, or rather continuance of decay among the teeth—one of which, a local one, is especially deserving to be mentioned, as its occurrence is denied by some writers, viz., the extension of the inflammation, and of the subsequent mischief to the antrum of Highmore.

When decay has but slightly attacked a tooth, and the mischief it has effected is superficial and not extensive, the dentist will be able to check its progress by removing the diseased portion, and imparting a polish to the dentine beneath. When, however, the disease is deeper, and of greater extent, the whole of the decayed dentine must be cut away, so as to leave a sound surface beneath; the extended cavity thus formed, having been so prepared that it can contain and retain the stopping matter, should be cleansed from any chips that may remain, and fully dried, after which it may be

stopped, that substance being used as the plugging material which is best adapted to the case, and will, while it resists the destructive influence of the saliva, be of sufficient hardness to support the mechanical pressure during mastication. If there be any degree of tenderness about the diseased tooth, so as to render it impossible to operate, powdered nitrate of silver, or the chloride of zinc may be applied to remove it. It is sometimes necessary to use the caustic more than once, and great care is requisite in its application. In America, the dentists avail themselves of the caustic action of arsenic for this purpose,—a practice decidedly unjustifiable and unnecessary, as we have other and less dangerous escharotics at command. It is not meant to imply that great danger attends the use of arsenic; but as it is a well-established fact that very minute portions of that mineral may injuriously affect the frames of some persons, and that it is a poison capable of being absorbed into the system when applied to a wound, and then of causing symptoms indicative of its poisonous influence, its application even to a decayed tooth must be condemned. Surgeons have long since ceased to use it as a local escharotic; it has since fallen into the hands of empirics, who still employ it for the cure of cancer, which they regard as a local disease. A few years ago, a very promising young physician died in America, under very peculiar circumstances, soon after having passed under the hands of a dentist, who applied arsenic to a decayed tooth. As the report went that he had been poisoned by the mineral, a very rigid inquiry was instituted; and while some still held that the toxic action of the arsenic was

the cause of death, others were of opinion that the decease was the consequence of erysipelatous inflammation, set up by the irritation induced by the employment of the arsenie. With either explanation, the death of this unfortunate gentleman militates strongly against the application of arsenic to decayed teeth. Here, in this country happily, the practice has gained but little ground, but still there are a few dentists who employ it, and justify their doing so, on the plea that they use so small a quantity, that it cannot be injurious. They must be ignorant of the fact, that the annals of medical jurisprudence show that a very small quantity, applied to a wound where it may be absorbed, may prove injurious, although it may not destroy life. Besides, as already stated, we have other and equally effective escharotics, which are free from risk when carefully applied. Arsenic, even if it does not cause constitutional irritation or palsy, may set up local mischief difficult to control. Inflammation of the periosteum covering the fangs of the tooth, and lining the alveolar cavity—one of the evils sought to be avoided by the cutting away the diseased part of the tooth, and the subsequent plugging,—with inflammation of the tooth itself, followed by extensive suppuration, or the formation of matter, the whole process being attended with the most severe suffering, has frequently owed its origin solely to the use of arsenic. The whole train of symptoms attending inflammation of the periosteum, and the consequences to which it gives rise, are such as should induce every reflecting dentist to banish arsenic from his list of medicaments.

Dr. Castle, a surgeon-dentist practising in New York,

in a communication published recently in the "Lancet," thus states the results of his experience on "the use and abuse of arsenious acid (arsenic) as an agent for destroying the dental pulp and nerve, curing the tooth-ache." He first describes the terrible results of the indiscriminate use of large quantities of arsenious acid for the destruction of the dental pulp. He shows that, however carefully and completely it may be preserved within the decayed cavity of a tooth from direct communication with the process of insalivation, it will gradually destroy the nervous fibrils within the fangs of the tooth, and thence penetrating to the periosteum and alveolus, will produce its characteristic and fearful effects on those structures. Instead of relieving tooth-ache, the first consequence of its application is the increase of pain to a frightful and almost unbearable extent. Such torture cannot, however, continue long without producing intense inflammation, which in most instances is followed by exfoliation of the alveolus, and its concomitant miseries. Dr. Castle, however, approves of the use of arsenious acid in very minute quantities, but not until after the nervous pulp has been paralysed and destroyed by an agent more suddenly violent in its action. His plan is, first to remove the diseased dentine from contact with the nerve; then to force a small wire of gold, which has been dipped in nitric acid, as far down as possible into the cavity of the tooth: this, he says, is attended with very little pain. He next inserts a pill of white soap, containing one-fiftieth of a grain of arsenious acid, and covers this with wax, or cotton dipped in creosote. After a week or two, the tooth, no longer tender, is fit to receive

the stopping of amalgam or gold, He adds that, in fifty per cent. of the cases where arsenic is largely applied, abscesses formed at the apices of the fangs ; and that in another thirty per cent. the teeth were eventually extracted, from their acting as foreign bodies, and causing much irritation. He concludes by saying that it is “a practice at all times to be reprehended, as being alike disastrous to the tooth, as well as to the health and comfort of the patient.”*

This strong condemnation of the use of arsenic in decayed teeth, coming from an American dentist of great repute, materially strengthens the arguments and assertions already advanced against the practice. The application of arsenic in such cases should be altogether abandoned : it may do harm, even in the very minute doses employed by Dr. Castle ; and cannot be of the slightest service, inasmuch as the only object for which it is recommended is the deadening the diseased nervous pulp, and this Dr. Castle unadvisedly proposes to effect by a proceeding almost equally disastrous to the tooth. Nitric acid is a bad agent to apply to the nerve : it causes severe pain, and at the same time materially forwards the progress of decay. If it be used in excess, or be not very carefully applied, the adjoining teeth, the gums, and even the jaw-bone may suffer from its corrosive action ; and thus may be induced a train of symptoms as violent and as dangerous, locally, as those resulting from the influence of arsenic. Its poisonous action, however, will not affect the constitution, as may happen when arsenious acid is the agent employed.

* “Lancet,” April 5th, 1851, p. 382.

The chloride of zinc, which has been already spoken of as an escharotic, and which, we believe, was originally recommended by Mr Druitt in the "Surgeon's Vade-Mecum," is far more worthy of employment in those cases of decayed teeth which are tender from exposure of the nerve, &c., and its application may be effected without risk, provided the nerve be not the seat of inflammation at the time, and has not been recently, as in that case the inflammatory action would be readily re-excited by the action of the caustic, and the unfortunate patient would suffer severely. Under other circumstances, the tender surface of the nerve will lose its sensibility after the escharotic has been applied, and the tooth can then be plugged, and become a useful and valuable organ. Another caution is necessary prior to using the escharotic; it is advisable to make certain, by a careful examination, that there is not a thin layer of dentine covering the nerve, before the chloride is used, as otherwise the salt, dissolving in the fluids in the cavity, will soak through the dentine, and severe irritation and inflammation, with their usual results, will follow; while the nerve not having been exposed, the caustic cannot deaden its sensibility, so that in addition to the inflammation induced by its action on the layer of dentine, there still will be the original tenderness and disease of the dental nerve and pulp, for which the chloride was used. Finely-powdered nitrate of silver is employed by some dentists as the caustic agent, to modify the diseased condition of the pulp. Its action is essentially caustic, and it requires great caution, as if too large a portion be used, it may injure the neighbouring parts. In one

case where it was rather freely used by a dentist in large practice, a portion of the salt was dissolved in the secretions of the mouth, and burnt a large hole in the side of the tongue opposite the decayed tooth, that organ becoming highly inflamed, and so swollen, that the mouth could not be closed without intense suffering for nearly three weeks, the unfortunate victim of the mistake being obliged to live upon slops the while. Nor was the application altogether effectual; for when its ill effects had ceased, the examination of the tooth showed the necessity of re-applying the salt in a moderate degree. Similar but less severe symptoms followed, and some time elapsed before the tooth was fit to be stopped with an amalgam. This occurred about ten years since. I have seen the gentleman operated on lately, and he assures me—and ocular evidence confirmed the statement—that the amalgam has been quite effectual and persistent. The tooth has not annoyed him in any way since. All these facts show the necessity for the greatest precautions and the most careful examination, prior to stopping a decayed tooth, more especially, as from the comparatively painless progress of decay, and from the careless indifference shown by many to the state of their teeth, at least until serious injury has been inflicted, the dentist is most frequently not consulted, till a cavity of some size has been formed, and the pulp and nerve are exposed. If this latter state has existed some time, so that the vitiated fluids of the mouth are in constant contact with the pulp, and have had time to act upon, and set up inflammation in it, it will assuredly be found more or less diseased, thus adding to the perplexities of the

case and of the dentist. This state of the pulp will be indicated by the continuance of pain after the probe, used to ascertain its condition, has been withdrawn. If the pain ceases when the probe has been removed, the dentine only is diseased, and the tooth may be stopped; but if it should continue, then the inflammation has extended to the pulp, and if the cavity be plugged, the matter which the diseased pulp secretes will be detained in the cavity, having no outlet, and will add greatly to the patient's sufferings, and to the mischief that is going on. Of course, in such a case, no dentist would think of stopping a tooth, until the disease in the nerve and pulp has been cured, or until those structures have been destroyed, when, after the lapse of a reasonable time he may safely proceed to stop the tooth.

Of all the substances used for stopping decayed teeth, gold is undoubtedly the best, when it can be employed; but to use it effectually, considerable care and skill on the part of the dentist, and patience on that of the person operated on, are requisite. To stop a tooth effectually, it is necessary that the plug should effectually exclude all foreign matters from the cavity in the tooth. This can be done with gold, which is used in the form of gold leaf; but to do it fully and thoroughly, considerable pressure is needed, so as to mould it completely to the cavity. Gold is very serviceable, therefore, when it can be used, more especially as the saliva cannot act upon it, and it is not subject to discoloration, neither is it liable to one of the great objections to amalgams—that of chipping at the edges. There are many dentists, and in extensive practice, who rarely or never have recourse to stopping a tooth with gold, because,

in the first place perhaps, it is not adapted for every tooth, and in the next, on account of the difficulties attending its use; a dentist, well practised in the art and science of his profession alone can use it properly, and some of those who condemn its application would act more honestly, were they to condemn their own want of the necessary skill. In those cases which admit of and require its use, with proper attention and experience, and the proper appliances, gold, in the form of leaf, is the best of all the stoppings.

In addition, however, to the difficulties attending the use of gold, as a plug, it requires so much preparation to adapt it thoroughly to the shape of the cavity, that many persons are unwilling or unable to submit to it. It must be well pressed in, so as to become as hard and resistant as the tooth itself. Another objection that will influence many, is the expense of this stopping, when the cavity to be filled is very large, because the metal to be employed should be very pure. With patience on the part of the person to be operated on, and perseverance and skill on that of the operator, almost any cavity may, however, be filled, and well and properly filled. The American dentists, as I have been informed by some of my patients, will devote several hours to the stopping a single tooth when they use gold; and if it be employed for every carious tooth, cases must occasionally occur, which will occupy considerable time in the performance of this delicate operation. Gold is pressed into the cavity after all evidences of decay have been carefully removed, until it is apparently completely filled. By means of a wedge-shaped instrument, however, the gold already used is compressed until a space is formed

into which more gold can be passed. This is filled up, and the process repeated, as long as a vacant space can be made. When this can no longer be effected, the external surface of the metal is rendered smooth, and then burnished. There are other modes of filling a decayed tooth with gold, but this is generally considered the best.

Where there is or has been disease of the exposed pulp and nerve, and where the cavity is very extensive, with a considerable external opening, and again, where the walls of a decayed tooth are little else than a mere shell, gold would perhaps be inadmissible, because the requisite pressure cannot be borne. In these cases dentists, having properly prepared the tooth previously, stop it with an amalgam.

These preparations—combinations of mercury with any metal—silver is that most frequently used—have been strongly objected to, principally by our Transatlantic brethren, on the ground that a person who has had a tooth stopped with an amalgam, is rendered liable thereby to fearful salivations, and so far do they, who hesitate not to use arsenic as an escharotic freely, carry their dread of the use of a harmless amalgam, that they are ready to expel from their fraternity those dentists who are above so paltry a fear, and use means calculated to be of service to a diseased tooth, and render it as useful, or nearly as useful as ever. Many teeth have been preserved for years by stopping with an amalgam, when the use of gold was inadmissible, which, without it, must have been soon extracted, and yet no mischief whatever has accrued. Those who dread salivation from the employment of a few grains of pure quicksilver

combined with another metal in the form of an amalgam, confound the action of a salt of the mineral with that of the pure mineral itself. That calomel and other preparations of mercury will induce salivation, and otherwise affect the health, every day's experience will attest ; but at the same time the constant practice of dentists as undoubtedly proves that a small portion of amalgam, filling a cavity in a tooth, has no such result. I never witnessed any bad effects from the practice in any case in which I had occasion to use an amalgam, nor do I believe that any other dentist ever met with such. The mineral in its uncombined state may be indeed acted upon by acids, and become oxidised, and then changed into a salt capable of acting upon the system ; but there are so many possibilities to be brought into play to cause such a result, that the probabilities are scarcely perceptible. Besides formerly, in certain cases of obstruction of the bowels, it was a common practice to give from a quarter to half a pound of mercury to the patient, in order that by its weight it might force a passage. Whatever the result might have been as regarded the unhappy sufferer's disease, no mercurial influence on the system was noticeable. Ladies, again, formerly used to swallow certain quantities of quicksilver to clear their complexions ; yet nowhere, as far as I have found, is it on record that they suffered from the deleterious effects of their cosmetic. Besides, even supposing the metal became oxidised, and was changed into an active salt—which is never the case, I may say—the quantity used is so small, that it would either not have any effect, or else would merely act like a small dose of calomel. I am myself a living proof of

this fact ; for I have several teeth which were stopped with amalgam years ago, from not one of which have I ever experienced the slightest inconvenience. The injury to the stomach which is said to follow the oxidising and breaking off of portions of the stopping, which, mixing with the saliva, are afterwards swallowed, is equally an unsupported statement, and has not ever been proved. It is mere theory, without a fact to back it.

The only real and feasible objections against the use of amalgams are based on their tendency to turn black, and even, it is said, to tinge the adjoining teeth, sometimes giving them a dark, at other times an unpleasant dirty-green hue. These certainly afford strong reasons against the use of an amalgam to those teeth which are in full view when the mouth is open, for which, therefore, when decayed and requiring to be stopped, gold or tinfoil must be used. Fortunately the front teeth are less liable to be affected by caries than are the molars, in which the discoloration of the amalgam is not an insuperable objection to its use, as they are quite out of sight ; and it is fair also to presume that when they are attacked by the disease, from being so much exposed to view, its ravages can be more readily detected. For the back teeth then, there exists no reason why, when the progress of decay has been such as to forbid the use of gold or other metal stopping, an amalgam should not be employed, and happily again within the last year or two a combination of mercury with other metals has been discovered by the Messrs. Ash, which is free from the objectionable change of color, and can therefore be used for even the front teeth when necessary,

without any subsequent annoyance from its discoloring the tooth which has been stopped, or its neighbours.

The amalgams previously in use were compounded of mercury with silver, copper or palladium; the metals are mixed together by trituration in a glass mortar, and when combined into the form of paste, are next firmly compressed in a piece of wash-leather, to get rid of as much quicksilver as possible. The cavity having been well dried, the paste is pressed into it, in such a way as to fill up every portion fully and completely. When the stopping has become quite hard, it should be burnished, even as is done with the gold plug. In this way teeth, which would have broken down under the pressure requisite to force in the gold leaf, so as to be an efficient stopping, may have the further progress of decay arrested, and be preserved for years.

A dentist of considerable celebrity in Paris, previously a strong opponent to the use of amalgams, some time back introduced a new preparation, consisting principally of cadmium amalgamated with quicksilver, which it was said was possessed of the enviable advantage of not being subject to discolouration. On the faith of this gentleman's name and reputation, his amalgam was readily and freely used by the most eminent dentists in London; but unfortunately it turned out a thorough failure, for although it certainly did not turn black, it had another and even a greater disqualification—it would not harden, and was therefore totally unfit for the purpose for which it was intended. In consequence of its softening and subsequent disintegration, it suffused the teeth that had been stopped

with it with a disagreeable yellow oxide tint. The failure of this amalgam, which was speedily withdrawn by the proprietor and his agents, led the latter, Messrs. Ash of Broad Street, to direct their attention to the examination of amalgams, and to experiments which ultimately led to the discovery of one which possesses, as has been already stated, all the advantages required of amalgams, with none of the hitherto attending defects. Prior to bringing it into general use, Messrs. Ash caused it to be examined by a jury of dentists, if I may so term them; fifteen practitioners in London, and fifteen in the provinces, men eminent by their skill, and from their large and extensive practice able to carry out the necessary investigations, and to form an accurate judgment on the results; and at the same time they themselves subjected it to the influence of such acids as may be found in the mouth and its secretions when in an unhealthy state, and also to acids of much greater power, the result being in every instance most satisfactorily in favour of the new amalgam. A tooth stopped with Messrs. Ash's preparation, when steeped in an acid, lost its lime, so that nothing but the animal matters composing it remained, and yet the plug was totally unaffected by the action of the fluid in which it lay. Its hardness was equal to that of the best stopping, and its color remained unchanged. It has therefore been adopted by the profession as the best substitute that has ever been brought forward for gold or tinfoil in the cases for which those metals cannot be used. Its actual composition is not known, but I believe that gold, tin, and silver, with mercury, constitute its principal ingredients.

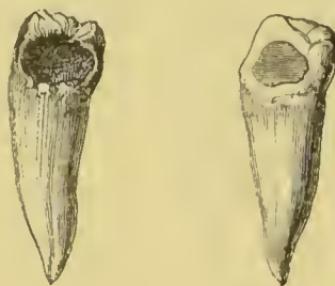
Some persons are in the habit of advertising amalgams for sale, by which the purchasers are to be enabled to stop their own teeth. This practice is one of the most pernicious that can be adopted, inasmuch as it is absolutely and physically impossible for any one to perform the operation of stopping or plugging on his own teeth; the necessary preliminary steps for stopping a tooth must not only be inefficiently performed, but the attempt must be injurious, because all the ragged edges of the cavity and all the decayed portions of enamel and dentine cannot be removed, nor will the plug remain in the tooth, unless there be a firm and sound wall of dentine to retain it. Not one of these conditions can be secured by any one operating on himself, and least of all by one who has no real knowledge of the surgical and mechanical processes necessary effectually to stop a tooth. If the tooth which is stopped by an unprofessional self-operator be at the time in a state of inflammation, the most serious consequences will result. The matter that is secreted will be pent up in the cavity, great pain and suffering will be experienced, and the disease will extend to the fangs and sockets, where the matter will burrow, and may make its way through the bone and gum, or form an abscess in the socket itself. The only relief that can then be afforded, is the removal of the ill-advised plug, and the employment of remedies to lessen inflammation, and cleanse the diseased and irritated cavity; perhaps even medical assistance may be necessary. When the tooth has been restored to a more healthy state, it should be subjected to the care of an experienced dentist, who will employ the measures requisite to render it an efficient

organ, available for the purposes for which it was originally intended. But it may be, and it not unfrequently happens so, that the mischief thus inflicted has proceeded so far as to render it impossible to be remedied, and that nothing remains but the extraction of the damaged tooth, and the employment of certain measures subsequently to remove the inflammatory and suppurative action going on in the socket and jaw-bone.

Bell has described two cases, which forcibly illustrate the danger of filling a tooth, without the complete removal of the decay previously, or when the nerve is exposed, especially if it be inflamed. In one of the cases, the patient, a lady, was brought to such a state, as to excite the most serious apprehensions for the result. Although the jaws were apparently immovable, Mr. Bell fortunately succeeded in separating them so far by wedges of wood, as to enable him to introduce a small pair of forceps, and extract the diseased tooth, after which all the symptoms of disease subsided. The other case was that of a medical man, who had had some teeth stopped, one of them being painful at the time. Tic dououreux of the face soon followed, and continued to increase in severity, until the tooth was extracted, when the pain immediately ceased, and never returned. These cases, and many others that any dentist in moderate practice could readily supply, show the great danger of stopping a tooth while the nerve is exposed or inflamed, and also the risk incurred by intrusting such important organs to the care and supervision of uneducated empirics.

The subjoined engraving represents two teeth, the

one to the left showing the cavity caused by decay, with ragged edges, prior to its being prepared for the insertion of the plug; that to the right a tooth with the stopping applied, and duly and properly burnished, having a firm and strong wall of dentine, to retain the filling in its place.



In a preceding page it was stated, that certain diseased conditions of the socket, and jaw, and of other parts neighbouring to the decayed tooth, are induced by the continued progress of caries, if it be not discovered and arrested in time by the measures already indicated. Inflammation of the periosteum, neerosis of a large portion of the jaw, alveolar abscess, with sinuses extending from the socket through the bone, the contained matter exuding through and forming what is termed a gumboil, tumors of the gums, exostoses or bony tumors springing from the fangs of the teeth or jaw-bone, disease of the antrum of Highmore, fistulous ulcers of the cheek, communicating and connected with the bone and diseased teeth, deafness, ophthalmia, and blindness from palsy of the retina, &c., may each and all be the result of the local irritation and inflammation set up by decay.

in a tooth. Here it would be out of place to dwell on the symptoms and treatment of these several complaints, as they are strictly and essentially surgical diseases, and fall consequently under the care of the surgeon rather than of the surgeon-dentist, although they owe their origin to a cause which belongs to the dentist only to remedy. Some few remarks may, however, be admissible, more especially as it is sometimes difficult for a surgeon, who has not paid particular attention to dental diseases, to trace these consecutive maladies to their true source.

Dr. Galengowski, of Wilna, some years back published an interesting case of amaurosis, or blindness of the left eye from a palsied retina, with intense suffering, in a man thirty-two years old, who had had an attack of rheumatism, to which the loss of sight was evidently referred. He had been previously under medical care for many months, but no examination of the teeth having been instituted, the cause of the disease was not discovered. Meanwhile a large abscess formed in the cheek, and discharged freely. At that time the pain was lessened, but it afterwards became so acute that he determined to lose his eye, and for that purpose consulted Dr. Galengowski, who, after questioning the man as to the cause of his sufferings, examined his mouth, and discovered a molar tooth to be greatly decayed. This was extracted, and the man soon recovered his sight. On examining the tooth a small piece of wood was found buried in it; it had probably been broken off a wooden tooth-pick, or else from a piece of wood thrust into the cavity, at a time when the tooth was very painful. The irritation

thus set up had caused perforation of the antrum, and all the train of painful symptoms from which he had so long suffered.

Dr. Greenwood describes in the "American Journal of Dental Science" a case of alveolar abscess, caused by the decay of the wisdom-tooth in the lower jaw, which had been unadvisedly stopped; in this case there was a fistulous opening under the ear, leading by a straight canal across all the intervening structures to the fangs of the diseased tooth, the opening constantly giving issue to a quantity of foul matter. So great was the induration of the tissues from the inflammation that had been going on, that the unhappy sufferer could not separate his jaws more than half an inch. The extraction of the offending tooth, and the employment of appropriate remedial measures, effected a cure.

Neuralgia of the face is not unfrequently caused by the pre-existence of a decayed tooth in the jaw, without any plan being adopted to arrest its progress. Mr. Descot mentions a case in which the neuralgic symptoms continued for ten years, before their cause was discovered to be a decayed tooth; and another instance is recorded in the "Gazette des Hôpitaux" for 1844, the patient being a young woman, twenty-seven years of age. Her sufferings from tic douloureux were most severe, and no remedy afforded her relief, although rubefacients and narcotics were freely used. At last the second molar tooth was found to be carious, and was extracted, when the pain immediately ceased. In this case, an attempt should have been made to cut away the decayed part, and to stop the tooth, for it appears that the enamel only was affected. It

is to be presumed, however, that her sufferings were so great, that she determined on the ultimate remedy at once.

It has been asserted, that disease of the great bony cavity, called the antrum, is never caused by a decayed tooth, but experience has long since demonstrated the fallacy of this opinion. An interesting case of disease thus induced, was published about twelve years ago, by Dr. Samuel, of Conitz, in "Rust's Magazin." The patient was a strumous female, thirteen years of age; the left cheek was much swollen, and there was a large tumor, which projected internally, forming a convex swelling in the mouth. The cavity supplicated, and the disease continued for several months. Several teeth were of necessity extracted, one of them, in order to open into and cleanse the cavity, the others, because they were loose and diseased. Six months elapsed before the girl got well, but afterwards the jaw and socket resumed their original shape, and singularly enough, within the first year after the cure had been effected, other teeth were cut in the place of those which had been removed.

Mr. Liston, in his Lectures on Surgery, published in the "Lancet," asserts that antrum-disease "most frequently arises in consequence of inflammation propagated from the sockets of the teeth and gums. A person has labored some time under caries of the teeth; the crowns have wasted away, and the jaws contain some considerable number of stumps. The patient is perhaps out of health, or has been exposed to severe weather, and his face begins to swell, the sockets of the teeth become inflamed, and {perhaps

an abscess forms at the root of one of them, or sometimes a sort of fungus grows about it. The abscess thus formed extends, the walls of the antrum become affected, and the abscess may burst into it; but I have seen," Mr. Liston says, "very large chronic abscesses, causing a considerable expansion of the upper jaw, without any communication with the antrum. In this way inflammation may be propagated into the antrum; an abscess may be formed in it, and then you have the foundation laid for a great deal of mischief. By-and-bye the antrum becomes expanded from the accumulation of matter, and if relief be not given by surgical means, the matter may burrow its way out through the tuberos process, or, which is more likely, through the anterior wall of the antrum, or it may escape by the side of the incisors, or some of the smaller grinders."

Mr. Liston adds, in another part of the same lecture, that "Bad teeth give rise to even more serious and troublesome diseases than this. A great many ulcerations about the mouth and face are dependent upon the pressure (?), the presence) of bad teeth." "From the decay of the teeth you frequently find great mischief arising in the neighbourhood. Many cases of ulcerated throat are caused by the presence of stumps, the affection being propagated along the lining membrane. Ulcerations about the lips and nose sometimes arise from disease about the incisors, or are kept up by it. I recollect the case of a gentleman, who came from the West Indies to be treated for an ugly ulcerated tumor on the cheek. Very active measures had been adopted in the island where he resided. He had had the part cut out more than once, and corrosive agents

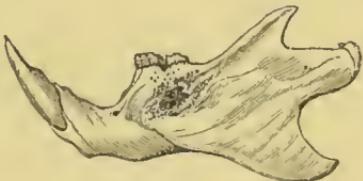
applied in all sorts of ways. Recourse had been had more than once to the actual cautery. On the latter occasion the surgeon had made him put a lime—a fruit like a small lemon—in the cheek, in order to distend it, and make the disease more apparent, and then a large red-hot skewer was thrust into the bottom of the wound. Still it did not heal, and he came here expecting to have some dreadful operation performed for the relief of his malady. The whole case depended on a decayed tooth in the upper jaw; it was taken out, and in a week he was well. He would have recovered at any period of the disease, if that tooth had been attended to."

K. K—, a girl about eighteen years of age, residing near Spital Square, was sent to me some few months since by my friend Mr. Startin, of Saville Row. She had been for five months under the care of a surgeon in her neighbourhood, who, according to the account she gave me, considered that her jaw had been fractured, and that the ills of which she complained were the consequence. She had a fistulous opening in the right cheek, opposite the second molar tooth of the lower jaw, through which matter was constantly oozing. On examining her mouth I found the wisdom-tooth greatly decayed, and accordingly it was removed; the other teeth were perfectly sound. About ten days after the operation she again called on me, and I was glad to find that the fistulous sore was perfectly closed, leaving however a deep indentation, to mark where it had been.

Such cases as these cannot be said to be of rare occurrence, and I have placed them on record, to show, first the danger attending the neglect of decay in the

teeth, and allowing it to make progress without a check, and secondly, to point out the necessity for a careful and accurate examination of the teeth, when any anomalous symptom or disease occurs in their neighbourhood. This examination, experience has shown, will be made more effectually by a dentist, as from practice he is better able to detect the more minute signs and symptoms of disease affecting the teeth, than are those who have not made dental surgery their study.

Some years ago the body of a rat fell in my way, and having then a leisure moment or two, I dissected it. On examining its mouth, I found the evidences of caries of the teeth, and a fistulous opening from the sockets of the diseased teeth into the interior of the mouth. As this in some degree illustrates the disease under notice, I have caused it to be engraved.



Cases will arise in which neither stopping, nor any other remedy is applicable, and where it becomes necessary to extract the tooth. The extraction of a tooth is required when toothache is so severe and continued as to exhaust the strength, by depriving the sufferer of rest and sleep, and by disordering the frame generally ; when caries has proceeded so far that no stopping is available, and pain from inflammation of the internal structures of the tooth is of constant recurrence. Irregularities, and malposition of teeth also ocea-

sionally necessitate their removal; fractures of the teeth, and certain operations about the mouth may also require the performance of this operation, which is besides necessary for some of the first set, when they have not been loosened and removed in the due course of nature, and by their persistence, compel the permanent teeth to deviate from the right course, and make their appearance in parts of the jaw, where their eruption must constitute a deformity. The cases which have just been narrated will show another cause for extraction, but even that depends primarily on caries.

The instruments at present employed in the removal of a tooth are the forceps, and the key. The former are more generally applied, and properly so, as with their aid there is a greater probability of removing the tooth without breaking it, or damaging the jaw or gum, and most assuredly with much less pain than is incurred when the key is used. There are a variety of shapes and forms in which the forceps are made, many dentists having made some trifling alteration in the curve of the part in which the tooth is enclosed, or some difference in some other part of the instrument, in consequence of which they consider themselves entitled to lay claim to originality, and to improvement in the instruments they use. These differences in shape, sometimes so trifling as to be hardly perceptible, are generally of little, if any real practical value. It is of course necessary to have a differently shaped pair of forceps to extract a molar tooth, to that which would be employed for an incisor or a canine. The shape, size, and direction of teeth differ, and so must the instruments which are used for their extraction, but whatever instrument is used, it should

be so employed as to cause as little damage as possible to the neighbouring parts, and to inflict as small an amount of pain on the sufferer as can be.

The key is decidedly an objectionable instrument. It offends all the known and admitted principles for the extraction of teeth, and yet there are some rare cases in which its use is almost absolutely necessary. The fulcrum, when the key is used, rests on the alveolar process, or rather on its side, and the force used to extract the tooth is very great—much greater than when the forceps are employed. Besides which the removal of a tooth by the key cannot be called an extraction so much as a forcing out. By the lateral and then upwards action of the forceps, the tooth is first loosened from its attachments, and then drawn out. With the key, after it has been duly and properly applied, little more is required than brute force to remove the tooth, which is forced out by a lateral movement in one direction only, by which great risk of fracturing the alveolar process and separating a large piece of it from the jaw, is incurred. In extracting teeth, great skill is required ; an accurate knowledge of the anatomy of the teeth, of the shape and direction of their fangs and sockets, is also requisite, and moreover, a due appreciation of the degree of force requisite to remove the annoying tooth. Again, as teeth are most frequently extracted on account of caries, and the decay not uncommonly extends to the level of the socket, the dentist must be able to appreciate the amount of strength yet remaining in the walls of the tooth, with many other particulars which will at once strike the mind of a scientific dentist. And yet how often is

this operation undertaken by persons utterly devoid of knowledge upon this point, as well as upon most others, and whose evil work furnishes employment, not only for the mechanical dentist, but for the surgeon also, and that for many months. Blacksmiths, barbers and druggists seem to fancy that they enjoy a prescriptive right to extract teeth, and they do so by wholesale ; others, again, undertake the operation with no other experience perhaps than having seen it done, and sometimes even without that. They have seen a nail pulled out of a piece of wood ; peradventure, even they may have effected that little operation themselves, and surely it is not more difficult to pull out a tooth than a nail ? But enough of this ; we could fill pages with cases illustrating the evils of unskilful, uneducated operators undertaking to extract teeth ; we could give instances of months of suffering, of fractured jaws, of pieces of the bone broken off with the contained teeth, and bound only to the mouth to which they belonged by the gum and lining membrane. We could tell of fearful and bloody operations, rendered necessary to remedy the mischief these interlopers have caused, and could give many examples of their utter ignorance and their unmitigated folly. But we forbear, in the full hope that those who read these pages will never trust themselves in the hands of uneducated pretenders, or allow them to perform an operation which requires great skill, anatomical knowledge, and experience, in order that it may be rightly and safely performed.

The excision of the crown of a decayed tooth—an operation occasionally practised in the hope that the stump thus left will remain quiet, and not take on

inflammatory action, is after all, a more plausible than useful operation. The living structures of a tooth exist equally in the fang as in the body of a tooth, although perhaps not to the same extent; they are, however, equally liable to inflammation and its consequences, alveolar abscesses, periostitis, fistulous openings, &c., which will sooner or later end in rendering necessary the extraction of the stump, thus causing the unhappy sufferer to undergo two operations instead of one.

The extraction of stumps is effected sometimes with the aid of a pair of forceps fashioned for the purpose, and at other times with an instrument termed a punch, or elevator. In using the forceps, it is necessary to force their jaws into the socket, one on either side of the stump, so as to get a firm hold of it, or else its end, being very fragile from disease, will crush under the instrument. The key is occasionally used with success to remove a stump. The elevator may be also forced into the socket, between its walls and the stump, and the latter be either prized out, or driven outwards in a line with its axis. In the former case, either the jaw-bone or an adjoining tooth may be the fulcrum.

Before this chapter is closed, it may be necessary to make a few remarks on the use of chloroform or ether for the purpose of rendering the person operated on insensible to the pain attending extraction. This most important discovery, due in the first place to an American dentist, and greatly improved subsequently by Dr. Simpson's discovery of the anesthetic influence of chloroform, is eminently applicable to cases where the more severe and dangerous operations in surgery

are required; but as experience has shown that its employment is not unattended with danger, and as several valuable lives have been already sacrificed under its indiscriminate application—in some cases where it was given to prevent the pain from extracting a tooth—I must enter my protest against its use under such circumstances. The pain attending the removal of a tooth is severe—very severe—but it is also momentary, and in no way involves danger to life. It is not right therefore, that a drug—the exact influence of which the medical profession are not yet able to appreciate, or to counteract when it proves dangerous—should be employed, to obviate that which after all is comparatively trivial, when its use may involve loss of life. At all events, the dentist is not the person who should exhibit it. His duty is plain. He has to extract the decayed and troublesome tooth; if chloroform is to be given, let it be done by a person duly qualified to do so by practice and experience. In my own practice, I always have recourse to the acknowledged skill and experience of Dr. Snow, a gentleman whose writings show that he is practically, as well as theoretically acquainted with the influence of chloroform and other on the human constitution. The numerous and repeated experiments which he has made with respect to the action of those drugs on the nervous systems of the human body, and of animals of a lower order, and the valuable and important conclusions he has drawn from his researches, have given him a rank and station of the highest grade amongst anesthetic practitioners, and fully entitle him to the confidence and respect of the public, and of every practitioner of the healing art.

In some persons of a peculiar idiosyncrasy—that is, of a peculiar character of system, the slightest injury or abrasion of the skin is followed by a serious hemorrhage, that is very difficult to control. The removal of a tooth in such persons is generally attended with a similar result, and many cases are on record where that operation has induced a fatal hemorrhage. I have myself an entire family thus afflicted under my care, and I never practise on them even the simple operation of lancing the gums without great hesitation and dread. The treatment of such constitutions is partly medical and partly surgical; all that the dentist can do is to use every measure to compress the bleeding surface, and send for professional assistance. The leaf of the matico is said to be an excellent styptic, and the oil of turpentine, given internally, a serviceable anti-hemorrhagic. Various plans have been proposed, to stop the bleeding, by plugging the hole in the jaw, formed by the removal of the tooth, &c., some of which have been occasionally successful, but by far more frequently inefficient. Caustics of various kinds, together with the actual cautery, have been repeatedly employed, but generally without any beneficial result—a termination not to be wondered at, seeing that the cause of the mischief is dependent on a vice of the constitution—an hereditary diseased condition of the blood. Severe and painful operations—ligature of the great arteries, of the earotid principally—have been practised, but without any ulterior benefit following, the wound made in the operation being as likely as not to prove a new source of hemorrhage. The fact is, in these cases, the blood is itself in a state of disease, or the vessels con-

taining it are far more tenuous than is usual. In either case its continuous effusion is not to be arrested by local measures, and constitutional treatment can alone be of avail. This is unfortunately one of the many points regarding human physiology and pathology, respecting which medical men are still wanting in the requisite information necessary to guide them to the successful treatment of the disease.

CHAPTER VI.

FROM the want of proper attention to cleanliness, more especially in persons the secretions of whose mouths are in a vitiated condition, a smaller or larger proportion of the salts held in solution in the saliva, with other extraneous matters, such as, according to Mandl and other microscopic observers, infusorial animalculæ and their skeletons, are deposited on the teeth, whether natural or artificial, and when so precipitated, are commonly called tartar, or by some a salivary calculus or concretion. In an article on the teeth in the "Dictionnaire de Médecine et de Chirurgie pratiques," written by M. Bégin, we find the following analysis of its components, as ascertained by Vauquelin and Laugier; phosphate of lime 0.66, carbonate of lime 0.09, animal mucus 0.14, oxide of iron and phosphate of magnesia 0.03, water 0.07. Simon, the celebrated Prussian professor of animal chemistry, says, "Tartar on the human teeth consists of earthy phosphates, epithelium scales, a little ptyalin, and fat;

and when examined under the microscope, there is seen an abundance of pavement epithelium and mucus-corpuscles, and in addition to these, numerous long acicicular bodies and infusoria of the genera vibrio and monas.”* Berzelius states tartar to be composed of, earthy phosphates 79.0, salivary mucus 12.5, ptyalin 1.0, animal matter soluble in hydrochloric acid 7.5. More recent investigations, aided by the invaluable microscope, have shown, as Simon and others have asserted, the presence of, so to say, fossil infusoria in tartar; if it be taken fresh from the free edge of the gum, where it embraces the tooth, and dissolved in distilled water, living specimens of vibriones will be found in it. The process of mastication, it is said, causes the removal of the living vibriones, as do also acids and spirits when applied to the teeth; the experiments, therefore, should be conducted after a few hours have elapsed subsequent to a meal.

Several years ago M. Mandl advanced the doctrine respecting the presence of infusoria in tartar, which he seemed to regard as the principal source of the earthy phosphates contained in it. In his paper, which was read before the French Academy of Sciences, he says: “A soft substance of a whitish or yellowish color, is habitually deposited on the teeth, and sometimes becomes firmly adherent. This substance may accumulate largely, and growing firmer by degrees, may form the hard and dry concretion known as tartar. It increases in size by fresh layers deposited on its surface.” He

* Simon’s Animal Chemistry, translated by Day; Sydenham Society.

then speaks of the analyses made by different chemists, as above recorded, and says authors are in dispute as to its origin, whether it is a secretion or a deposit, and if the latter, from what. His own experiments led him to the belief, that it is a simple deposit of the skeletons of dead infusoria, agglutinated together by dried mucus, even as certain earths, according to Ehrenberg, are composed entirely of fossil infusoria. These vibriones, which he describes as varying in size, from one five-hundredth to several hundredths of a millimeter, exist, according to him in great amount in patients who have been for some days on low diet, and they also constitute the greater part of the mucous coating on the tongue in persons suffering from indigestion. This statement is singularly strengthened by an analysis made by M. Denys, of this coating, which he found to correspond chemically with tartar, and also by the fact, that persons so affected are very subject to this concretion about the teeth.

Tartar, from whatever cause produced, is found in more or less abundance about the necks of teeth, and sometimes on their bodies, more especially on those belonging to persons in a bad state of health. Persons suffering from fever, or from salivation, whether arising from constitutional causes, or from the exhibition of medicines, and those whose digestive apparatus in any part is out of order, are peculiarly liable to this concretion, but it may be met with in all states of health, and at all ages. Even the lower order of animals, such as sheep, cows, horses, dogs, tigers, bears, &c., do not escape. It is principally found in the neighbourhood of the salivary ducts, as on the posterior surfaces of the

lower incisor teeth, the external surface of the upper molars, and also in the irregular angles formed by the teeth, which the brush cannot readily cleanse, for which reason some writers conclude that it is deposited from the saliva. Its physical qualities vary much, in color, density, and odor. It may be either black, green, or yellow, exceedingly soft, or almost fragile from its hardness, and it sometimes becomes exceedingly offensive from the fetor to which it gives rise. In those who are habitual smokers, when their teeth are clogged with tartar, it will be of a very dark or black color. The degree of density is a question of time ; the longer it has remained on the teeth the harder it becomes.

Some dentists, judging from the difference in physical characters presented by tartar, are of opinion that there are at least two or three kinds of this concretion ; but chemistry has shown that this idea is a fallacy, as the varying appearances presented by it, do not depend on its chemical composition, and must therefore be caused by other influences. Mr. Saunders in his lectures, published some years ago in the "Forceps," a journal devoted to dental surgery, says : "These differences are probably referable to peculiar idiosyncrasies or diatheses, but upon this subject we are still too destitute of authentic data, founded upon extended and careful observation, to hazard more than a conjecture. The soft calcareous variety, of a light-brown color, and which is removed with comparatively little difficulty, will, I believe, be found generally associated with that delicacy of frame and transparency of skin which, with other signs, are recognised as indicating the strumous diathesis, and taking this as the culmi-

nating point, we may trace its gradual transition into the other varieties, which are met with in more robust temperaments. Another kind of tartar of frequent occurrence, is of a more dense character, of a dark color, approaching to blackness, and adheres with considerable tenacity to the teeth on which it is deposited. It requires considerable force to effect its removal, and exhibits an almost crystalline hardness, while its rate of deposition is much slower than that of the variety just described. A third kind of tartar, less frequently encountered in practice, but more rapid and certain in its destructive effects, is of a dark-green color, and is found sparingly deposited upon the teeth, but gives rise to erosion, or scaling off of the enamel." The varieties just described would almost seem to warrant the division of tartar into different kinds, but the fact still remains, that their chemical composition is identical. Most dentists now consider that the last variety alluded to by Mr. Saunders, is not in itself destructive to the teeth, but is deposited on them after they have been killed by some other agent.

Tartar, in itself, is not directly injurious to the teeth, but it affects them indirectly, by exciting irritation and inflammation of the gums, and inducing their recession with absorption of the walls of the socket; so that more and more of the neck of the tooth becomes exposed, the organ itself is loosened, and becomes a source of annoyance, and ultimately either falls out or must be extracted.

The removal of tartar, as well as its prevention, is attempted by the use of the brush, and this may perhaps be effectual when the deposit is still very

soft, and the teeth perfectly sound, and of regular shape. When these conditions are absent, the only resource is in the surgical skill of the dentist, who must employ certain instruments used for *scaling* the teeth. This term scaling is somewhat inappropriate, and does not really express the nature of the operation it is meant to signify. All that is done is the removal of the tartar, and this must be done effectually. The instruments employed vary in shape, so as to be adapted to the different shapes and angles formed by the teeth, and their necks, where the tartar is most found to collect. When the teeth have been loosened by the presence of the tartar, and the subsequent irritation of the gums, and absorption of the socket, great caution is requisite in separating the extraneous matter. In some cases that have fallen under my notice, the entire body of the tooth has been so encrusted with this adventitious substance that no part of it could be seen; and it occasionally, but not very frequently, happens that the teeth are so loosened by it as to have no hold on the jaws or gums, they being merely kept in their place by the tartar itself, which is deposited on them and on the adjoining teeth *en masse*. The duty of the dentist in such cases is attended with considerable difficulties. If the removal of the tartar be attempted, only a small portion should be taken away at a time, the parts being then left for a few days to recover a more healthy condition under the use of an astringent wash, after which the operation may be repeated, until the whole of the salivary concretion has been removed. The use of the lotion should be continued for some time after the scaling of the teeth has

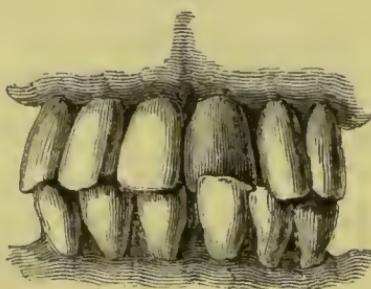
been completed. When tartar has been deposited on the teeth for a long while, its removal is generally attended with some bleeding, which is rather salutary than otherwisc. The operation is one of considerable simplicity ; it consists simply in detaching the tartar in a mass from the teeth to which it is adherent, and also from between them, and removing afterwards any portions which may be found upon the teeth, so as to leave them with a clean surface.

Irregularities of the teeth, as regard their shape, position, direction, crowded condition, &c., are met with more frequently than is supposed to be the case. The causes of irregularities are principally mechanical, depending either on the non-increase in size of the jaw, in proportion to the growth of the teeth to be contained in its alveolar arch ; on the position of the permanent teeth with reference to the fangs of their predecessors, the temporary teeth—that is, when a permanent tooth, about to make its eruption from the jaw in which it has been long imbedded, takes a position in regard to the temporary fang, different to that which nature has indicated ; it consequently makes its appearance in an irregular situation, either above, in front of, behind or laterally to the place it should have occupied ; or again, on the non-absorption of the fangs of the temporary teeth, by which consequently their successors are compelled to take a wrong direction ; and lastly, on the increase in size of one jaw in preference to the other, thus producing an unwonted irregular prominence or projection of one set or jaw over the other.

The irregularities of the teeth, to be met with in practice, will not in very many instances depend solely

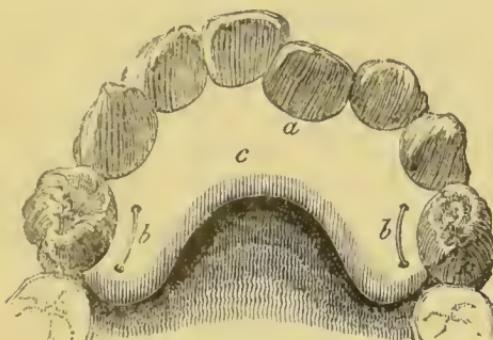
on any one of the causes just mentioned, but will show a degree of dependence on more than one. According to the nature of the cause, and the length of time the irregularity or malposition has existed, will be the probability of effecting a cure. Congenital malformation of the jaws does not often admit of relief, but when they are well-formed, excepting that they are too small to permit the due and natural arrangement of the teeth, the arch may be expanded in time by mechanical applications, such as the employment of an elastic gold band, accurately fitted to the necks of the teeth, and so applied as to force the molar and bicuspid teeth gradually outwards.

The front teeth are more subject to irregularity than are the molars. The wisdom-teeth, or third molars, are however liable to several varieties of malposition, which are productive of great annoyance, and have even caused death by the irritation they have induced. The accompanying engraving represents a not uncommon condition of irregularity. The left incisor of the upper jaw is overlapped by the corresponding tooth in the lower maxilla; the other teeth are in their right position.



The cause of this abnormal condition is a compound one, dependent partly on the more rapid development

of the lower jaw and its teeth, and partly on the eruption of the permanent set of teeth, while the fangs of the temporary set were still unabsorbed. When this state of the teeth has been thus produced, mechanical measures can alone restore the offending teeth to their position. The woodcut now about to be given will show how this is effected. There is a plate made of bone, *c*, fitted to the palate and the backs of the teeth; *b*, the situation where the silk ligatures are passed to keep the plate secure; and *a*, where the wedges are inserted, to press upon the faulty teeth.



A gold or bone plate, properly adjusted to correct the irregularities, by pressing forwards the teeth which are set too far backwards, or drawing back those which project, is applied, and worn for a considerable period of time, with such modifications as practice and experience dictate. At the same time the molar teeth should be capped, so as to preclude the possibility of the front teeth coming in contact with each other during the process of mastication, as the action of the lower front teeth, when in actual contact with the upper, would tend to keep up the irregularity, and

prevent success attending the mechanical applications employed to remove the deformity. When the patient is what is termed "underhung," the front teeth of the lower jaw, on closing, come immediately in front of those of the upper. In some cases the latter project greatly, so as to constitute an absolute deformity. Other cases occur in which the teeth of both jaws meet together during mastication. We have not then so much apparent deformity as in the other instances, but the teeth are injured, their sharp edges being sooner or later ground down, and the dentine exposed. The incisor teeth then, having lost their cutting edges, become little better than grinders, that is to say, they are no longer adapted to cut or tear the food, and are only fit to crush it. All these cases, by proper appliances used in early life, may be remedied, the mechanical splints, so to term them, or plates being worn for a longer or shorter time, according to the extent and duration of the malposition, and the age of the patient. Prior to puberty, they are of comparatively ready correction; after that period the difficulty increases more and more the nearer the age of one and twenty is reached, after which but little or nothing can be effected, as the jaw-bones have then acquired their full development and strength, and would be more likely to be fractured than to yield to the extension-power of any pressure, however gradually it might be exerted.

To remedy these and other irregularities of the teeth, either partial or general, the chief agent employed is pressure gradually applied, from without or within the mouth, according as the circumstances of the case re-

quire. The management of these cases strongly exemplifies the advantages of a mechanical turn of mind. The causes of irregularity are mechanical, and the remedy must be equally so, with the exception that, in some cases, from the unnatural smallness or want of proper breadth of the jaw, some of the teeth must be removed to make room for those which are out of place. The teeth to be selected for extraction should be the bicuspids, if in any way tainted with disease; but if all the teeth be apparently perfectly sound, then the first molars should be removed, because, of all these organs, they are those most liable to decay.

During and after this mechanical interference with the teeth, and their alteration of position by the appliances that have been used, the teeth thus acted on feel loose and painful for some time. These feelings, however, are not of long duration, either in early life, or at the adult period; but to prevent any injurious consequences, it has been recommended to secure the loose tooth or teeth to their neighbours by a ligature of silk, so as to prevent any motion, and also to preclude any tendency to fall back to their original malposition.

It need hardly be said, that when the permanent teeth are driven out of their proper situation by the non-absorption of the fangs of the temporary teeth, and by the persistence of the latter in the socket, it becomes the duty of the dentist to extract the tooth or teeth of the first set, and thus make way for the eruption of the permanent teeth in their usual position. It sometimes happens, however, that even when extraction of the first tooth has been effected, the direction of the permanent tooth continues unaltered, and sys-

matic and sustained pressure is required to bring it to its right place, and prevent deformity. For these and similar reasons the dentist should be occasionally called upon to examine the mouths of children, and ascertain whether the teeth are advancing in the right direction, and are in a healthy condition.

As irregularity of position and direction of the teeth is curable only by means of properly directed and sustained pressure, it follows that after a certain period of life, when the maxillary bones and the sockets for the fangs have arrived at their full development of size and strength, it must be useless and worse than useless to attempt a cure, especially if the deformity be very extensive, because the pressure, although it be gradually applied, must be directed to cause modifications in the shape of the jaw-bones as well as in the direction of the teeth ; and this, it is evident, cannot be effected when these bones, with their alveolar appendages, are fully formed and consolidated, at all events not unless the pressure be maintained for a very considerable period of time, and be such as to inflict suffering and great inconvenience, while it is far from certain whether the alteration in shape, should it be effected, would be permanent, after the removal of the compressing apparatus. It is not advisable, therefore, to have recourse to any instrument for rectifying these irregularities after a certain age ; and the question next arises at what age should the hope of remedying a most unsightly deformity be abandoned ? By some writers on this subject, the period of puberty, the age of fourteen, is considered to be quite late enough in life for any such attempt. Others again—and their opinion is sufficiently

prevalent among the profession—fix it at sixteen. Nevertheless, it is evident that the apparatus may be serviceable at even a later date, for Mr. Bell mentions cases in which he has interfered successfully for patients nearly twenty years of age; and other cases have been recorded in which the mechanical influence of an apparatus proved to be curative even after the expiration of the fifth lustrum. These last-named cases must, however, be regarded as exceptional: as a general rule it would not be safe to apply such an apparatus after the twenty-first year. It need scarcely be added that, to ensure a speedy and a perfect cure of this deformity, the earlier the apparatus is worn the better.

Irregularities of position of the wisdom-tooth, when they occur, often give rise to extreme general and local irritation, which can only be remedied by the removal of the tooth. Malposition of this tooth in the lower jaw is accompanied by more serious disorders than when the same tooth is misplaced in the superior maxilla. Velpeau details several cases in which this irregularity was productive of the greatest suffering. In one instance, not only was it necessary to remove the tooth, but also the whole of the coronoid process and several other portions of the jaw-bone, with some loose teeth. This, however, is an extreme case. Nevertheless, both epilepsy and insanity have been caused by the irritation consequent on the cutting of the wisdom-teeth, and have been cured by freely laneing the gum over them, and the subsequent eruption or extraction of the tooth.

The loss of teeth, whether partial or complete, can be remedied either by the adaptation of natural teeth,

taken from the mouths of others, or of artificial teeth, made from a variety of material, in imitation of those which nature provides. They are fixed and secured in the mouth, either by metal or bone plates, forming the base for the artificial teeth, by springs, or clasps, or by atmospheric pressure. The loss of teeth, on whatever cause it may depend, involves, as has been already stated, not simply the deformity immediately resulting from the absence of organs which assist in forming the contour of the mouth, but when the front teeth are those which have been removed, a considerable impediment is offered to an intelligible and distinct articulation, while the features anticipate the appearance of old age, and from the want of due and full mastication of the food, indigestion with its various ills and sufferings follow. The teeth supplied by the aid of the dentist, to remedy and prevent the inconveniences sustained in consequence of the loss of those which nature had furnished, although, when well made and neatly adapted to the structures of the mouth and jaws, they subserve the purposes of mastication and often restore the articulation, as also the general expression and contour of the features, and impart a degree of comfort which those alone can appreciate who have been long deprived of teeth, yet cannot be regarded as equal to those which were furnished by nature. They are wanting in several points. They, of course, cannot possess the faculty enjoyed by the natural teeth, of transmitting to the sensorium, or brain, the sensations imparted through their tactile powers, and in that respect must prove greatly deficient in value, when compared with the origi-

nal organs of mastication. Nevertheless the edentulous person, when he has been furnished with a well-made and neatly adapted set of artificial teeth, enjoys a degree of comfort and health, which he had not previously possessed, since he experienced the loss of his former masticators, and which he would deeply regret again to lose.

Dentists, when seeking to repair the injuries caused by the removal or loss of teeth, do so occasionally by means of natural teeth, taken from the mouths of deceased persons, which, when a single tooth only is wanted, is sometimes, but not often, secured by pivoting, and at others by means of a small gold plate, to which it is fastened by pins, or by clasps, which embrace the adjoining teeth, the fang having been previously removed. Artificial teeth are made from the ivory of the elephant, or from the tusks of the hippopotamus, or else in china. The latter are termed mineral teeth, and are by far the best and the most durable. They are incapable of decomposition by the vitiated secretions of the mouth, being made of an indestructible material, are always free from any taint or unpleasant odor, and are perfectly uniform in color. Being modelled in the shape of the human teeth, they exactly resemble them in form, and they also present that peculiar semi-transparency which is possessed by the crystalline fibres of the human enamel.

Chapin Harris asserts that teeth made from the dentine of the elephant's or hippopotamus' tusks, give to the breath, when returned from the lungs, an insufferably offensive odor, which cannot be corrected or prevented. They may be washed, he says, half a dozen times a day,

and taken out and cleansed at night, but it will still be grossly perceptible; and, although it may be much worse in some mouths than in others, none who wear teeth formed from this substance are entirely free from it. Were this indeed generally the case, the dentine of the hippopotamus would be excluded altogether from use, as is that of the elephant, but its wholesale condemnation, pronounced by Dr. Harris, will not be reechoed by the profession in this country. Experience has shown that dentine teeth do not impurify the breath, unless they are neglected, covered with *sordes* and other decomposing matter, and allowed to pass into a state of decay.

Artificial teeth can be supplied in any number, from one to an entire set. Natural or mineral teeth are generally preferred to replace the loss of the incisors and of the bicuspid, and occasionally, though but rarely, even of the molars. When a complete set is made however, natural or mineral teeth are selected for the front, the molars being prepared in one piece, or block, as it is termed, of the ivory or dentine of the sea-horse.

The teeth supplied to man by nature for the mastication of the food, are retained in their situations by fangs, which are sunk into and imbedded in cavities in the jaw-bones, called alveoli, or sockets, one for each fang. This, it is evident, is an advantage that cannot belong to artificial teeth, and other means must therefore be resorted to for their retention. Dentists, therefore, when they fix false teeth, employ a gold or bone plate, which is securely fastened to them, and adapted to the shape of the gums, and sometimes, in the upper jaw, to part of the palate; by means of its spreading

over a considerable surface, the pressure during mastication is not directed upon the false teeth, but upon the jaw-bones themselves, as was previously the case with the natural teeth through the medium of the fangs. This plate forms an essential portion of the artificial set, and must be accurately adapted to the part it is intended to cover, if the usefulness of the artificial teeth and comfort in wearing them be desiderata with the dentist. The gold used in its manufacture should be of a fine and pure quality. Injurious consequences have attended the employment of an inferior and less valuable metal. In the "Provincial Medical and Surgical Journal" for October 30th, 1850, Mr. Tearne of Worcester has published a paper "On the poisonous qualities of silver when exposed to the secretions of the mouth." He says he has long observed that when silver is used for the basis-plate for artificial teeth or palates, the wearers suffer from chronic inflammation of the mucous membrane of the mouth and gums, and are liable to repeated attacks of bronchitis and enlarged tonsils upon the least additional exciting cause. They also labour under dyspepsia, ptyalism, indisposition, and much relaxation, always complain of a vitiated taste, and usually present a furred tongue. These symptoms are sometimes much aggravated, and amount to habitual nausea, with occasional attacks of vertigo, impaired vision, and often to some degree of deafness, probably from the morbid condition extending to the Eustachian tubes; they are also greater or less in proportion to the quantity of the deleterious agent present, and the constitutional tendency to, and susceptibility of, morbid influences. He describes the case

of a female, who in consequence of wearing a silver plate connected with artificial teeth, had long been under a physician's care. She was suffering severely from sore throat and great debility, and appeared to be sinking under gradual exhaustion and protracted suffering. On examining the mouth, he found the gums inflamed, spongy and ulcerated, detached from the few remaining teeth, which were loose and useless, from the inflammation extending to the periosteum lining the sockets. The salivary and mucous secretions were much altered, viscid and scanty, and there was some degree of fever. The parts directly in contact with the silver were most diseased, and the mischief appeared to extend from them to the throat and adjacent parts, which were so much swollen as to render deglutition difficult, and the voice much modified. All this sad condition was speedily remedied by the removal of the bad metal, which had been, shall I say fraudulently, employed to form the base for the artificial teeth, and by the use of a tonic astringent lotion and the exhibition of the medicines prescribed by the physician; after which a gold plate of twenty carats was used, and the diseased condition of the mucous membranes did not return.

Mr. Tearne, not content with knowing the fact that silver plates cause so much destructive inflammation, very properly sought to discover the cause, and accordingly applied to Dr. Herapath, of Bristol, and Mr. Bullock, of Conduit Street, London, chemists of well-deserved repute. Both these gentlemen referred the mischief to a slow and constant galvanic action, silver being rarely perfectly pure, and generally containing

more or less copper. Both metals are acted upon by the chemical constituents of the saliva, more especially by its sulphocyanic acid and its compounds. Dr. Herapath besides confirmed Mr. Tearne's experience in this matter, he having been previously consulted respecting it by a dentist at Bristol. He strongly advised that silver should not be used at all for the basis-plate of artificial teeth, and in this view Mr. Bullock also concurred. Mr. Bullock asserts that all the soluble salts of silver are extremely *acid*, and in his opinion metallic silver should never be employed for dental purposes.*

* *The Times* a few days since contained the following paragraph :—“The public and the medical profession generally are not aware of a very fruitful source of disease which arises from the introduction into the mouths of many thousand persons, of metallic plates and other apparatus for the securing artificial teeth. These plates, &c., are nominally constructed of gold, but, in point of fact, in innumerable instances there is little or no gold in the construction of them ; silver gilt, or some still baser metal is employed, which, being acted upon by the acids of the stomach, produces a poison which insidiously undermines the health, causing cancer and other diseases. The false delicacy of the sufferer, and his ignorance of what causes his complaint, prevent him from receiving such advice as would meet his case. This imposition on the public admits of a most simple remedy ; it is merely compelling all persons who are employed in the trade or profession of making such plates, springs, &c., to have them stamped at the Goldsmiths' Hall, and a standard enforced which would guarantee the security of those by whom they were required.” This passage contains a great deal of truth, and several errors also. The practices thus strenuously condemned, are not those of respectable dentists,—of men who have been duly educated for their profession,—but of interlopers who are utterly

Dentists in respectable practice, when they employ a metal to form the base of artificial teeth, being equally desirous to secure the health and comfort of their patients, and to advance their own reputation, employ gold of either eighteen or twenty carats, although in some cases even sixteen carats' gold will be sufficient for every purpose. Silver, it has been already shown, will prove the fertile source of many diseases, and of great and protracted suffering. What, then, shall be said of the cheap, advertising, *soi-disant* dentists, who do not hesitate to employ copper, either plated or gilt, for that purpose? The serious results that must necessarily follow such a baneful practice should deservedly subject them to extreme reprobation; but what will not

reckless of the injury they may cause, and regardful only of the means by which they can obtain money from a deluded public. Neither is it true that the sad results of this disgraceful imposition were unknown to the medical profession and to the dentists. They have been exposed on more than one occasion. Again, it is the acids contained in the vitiated saliva, and not the acid secretions of the stomach, which are most operative in disorganising the baser metals and gilt silver when used for artificial teeth, although the latter may occasionally exert some influence. It is more than doubtful whether cancer can be thus induced; but chronic inflammatory affections of the throat, a diseased state of the gums, alveolar periostitis, chronic bronchitis, dyspepsia, ptyalism, vertigo, impaired vision, some degree of deafness, great debility, and general ill-health, may all be set up in the system, and protracted and severe indisposition be the result of the maintenance of a mineral poison in the mouth. The reason why silver plates are so injurious, is because that metal always has a larger or smaller quantity of copper in combination with it.—*Medical Times.*

the love of money tempt men to do? On the one hand patients, caught by the delusive assertion that cheap and efficient teeth are to be obtained at ——, apply for the promised assistance, regardless of the fact that good gold cannot be supplied for the amount charged, independent of the skill and labour requisite to adapt the teeth and plate to the mouth; and on the other the advertiser, caring little for his reputation with the individual patient, and still less for the comfort of the person who confidently places himself in his hands, uses the cheapest, and at the same time the most dangerous metals he can employ. It may frequently happen that a long while elapses ere the true source of the consequent illness is discovered, and then perhaps only by the corrosion and tarnishing of the plate that has been used; but cases have occurred in which the metal was so very bad that from the very first the unhappy victim —happy indeed in so soon discovering the imposition, and thus escaping long and serious illness—has been utterly unable to wear it. There ought to be some severe punishment for thus tampering, either through ignorance or wilfulness, with the health and comfort of the community.

The supporting plate of the artificial teeth is sometimes composed wholly of dentine, forming one entire piece of bone with the false teeth themselves, or else with natural or mineral teeth, fixed and secured to it in their respective situations by pins and other means. The larger the base to which the artificial teeth are affixed, the less will their pressure be felt, even during mastication. This is an important point, and should always be had in remembrance by the

mehanieal dentist. If a suffieiently extensive surface can be obtained for a base-plate of the requisite size, and it can be made to fit closely, so as to expel the acid seeretions of the mouth from between it and the jaw or palate, when pressed upon the gums, the artifieial apparatus or block will hold its position by atmospherie pressure. This, whieh has been made so much of by advertisers, as if it were a new principle known only to themselves, and put in aetion only by themselves, has long been known to all well-educated dentists, and indeed constitutes one of the principles taught them while studying mehanieal dentistry. Those who seek for publie notoriety by advertising teeth fitted by atmospherie pressure, are not unfrequently not fully aquainted with the condition of the mouth and of the dental apparatus necessary to enable the dentist accurately to fit and adjust artifieial teeth on this principle. It is impossible to apply teeth to be retained in the mouth on the principle of atmospherie pressure, if any of the stumps are allowed to remain, and project, if ever so little, above the socket, as they would prevent that accurate adaptation of the parts necessary to avoid the admission of air, or of any seeretion, between the block and the jaws, or palate. If this were to occur, it would counteract the atmospherie pressure, whieh, when there is nothing intervening between the block and the mouth, is suffieient to retain it in its place, and in close contact with the gums. The state of the palate and jaws requisite to admit of a suffieiently large base for this purpose has been already spoken of. Artifieial teeth fitted on this principle are the best and the most convenient; but more labour is required for their adaptation than

for blocks worked on ordinary principles. In old age the plan of retaining the teeth in the mouth by atmospheric pressure is inadmissible, on account of the changes that have taken place in the shape of the palate and alveolar edge of the jaw-bones.

When a dentist is about to prepare a set of artificial teeth, he first makes a model of the mouth and jaws in bees'-wax, previously softened, and firmly pressed against the parts of which a cast is required. If the modelling be successful, the wax will present a complete counterpart of the gums, of which a reverse is obtained by pouring on to it plaster of Paris mixed with water; when the plaster has set, it is taken away from the wax, previously softened, and it then presents, if the mould were correct, a thorough fac simile of the gums in every respect. This plaster cast is carefully compared with the patient's mouth, and then the set of teeth constructed in accordance, so as to be adapted to it, and any alteration the block may require is readily discernible afterwards when it has been placed in the mouth.

Tomes possesses an apparatus, which he has patented, for taking casts of the mouth, by which he is enabled to test the accuracy of his model before working the teeth. It consists of a material which softens at 212° , and then can be fitted on the plaster cast. When cold, if the model were true, the cast would equally fit the mouth; if it does not, it is again softened, and then carefully moulded to the surface of the gums, and allowed to harden. By another part of the patented apparatus, the base, when of dentine, and the teeth, are also carved by the machine. Some economy of time and material may be thus secured, but I think it is

doubtful whether the accuracy of adaptation will be equal to that which the efficient mechanical dentist can give.

When gold is used for the base of the teeth, casts and reverses are made in metal, and the gold plate hammered into the requisite shape. When dentine is to form the base, the cast is colored with a red pigment, and a block of dentine is brought into apposition with it. Its salient points are stained by the paint, and these are cut away with small tools, the operation being constantly repeated until the work is complete. It is necessarily a very slow and tedious proceeding.

The base being thus obtained, the teeth are next to be fitted. When dentine constitutes the base, the teeth generally are cut out of the same block. When gold is used, they are secured to the plate by pins through the teeth, fastened by solder. The teeth selected are either natural, bone, or mineral. The last-named, as has been already stated, are the best. The back or molar teeth are not unfrequently cut in one block, without the division into separate teeth, which obtains according to nature. The adapting the upper and under sets of teeth to each other requires great care.

When a complete set of artificial teeth is required, they are retained in the mouth by spiral springs at the ends of the pieces, connecting the two together. When only a few teeth are put in, they may be secured by gold clasps or bands, fitted round the natural teeth yet remaining in the mouth, or by the pressure of the atmosphere.

Even after the teeth have been fitted to the mouth, and have been worn some little time, some modification

may become necessary, because part of the block may press unduly on a portion of the gum, and excite irritation, or the pressure may not be equally distributed. Those persons, then, who have had artificial teeth adapted to their mouths, should pay the dentist an occasional visit for a fortnight or three weeks, in order that he may ascertain that the wearing them has not set up any irritation or inflammation in the mouth. Some inconvenience generally follows the use of artificial teeth at first, and they may even excite considerable nausea ; but, unless there exists a special cause of irritation, all these symptoms soon subside. Of course the wearer of false teeth must not expect to find that he can at once masticate with them as well as he used to do with those which nature gave him. He must serve an apprenticeship to them. As Tomes very justly says, " Artificial teeth must be regarded by the wearer as tools, the use of which has to be learned by patient trials. The first time you take np a joiner's plane you cannot work it ; nor would you expect to do so without previous practice : so with artificial teeth ; you have no right to expect to masticate effectually with them, until by practice you have learned their use."

Artificial teeth should be removed from the mouth at night time, and well cleansed, especially if they be composed wholly of dentine, as that substance is readily acted upon by the saliva, and undergoes decomposition in consequence. By carefully cleansing it, and keeping it highly polished, however, it may be preserved from decay for a long period. Dentine teeth, when not in wear, should be kept in a well-covered glass vessel, in

spirits and water. Mineral teeth, with gold clasps or plates, may be kept in water only, after they have been well cleansed, and all the particles of food, *sordes*, &c., removed. There is one other reason why artificial teeth should not be worn at night time, especially if there be only a few false teeth, with gold clasps binding them to the natural teeth in the mouth. If the clasps or bands get loose, the false teeth may separate from the others, and either be swallowed, or, what is a much more dangerous accident, may pass down the windpipe into the lungs. This is not a mere fanciful or theoretical conjecture. Two cases in which this accident occurred are on record. One happened in London, and the details are published in Guy's Hospital Reports; the other took place in Edinburgh, and the case was read, I believe, at a meeting of the Medieal and Chirurgical Society of that city. In one instance the presence of the block of false teeth, with the projecting gold clasps, set up irritation in the lungs, followed by all the symptoms of consumption, the patient ultimately dying. On examination of the body after death, the block of teeth was found in the right bronchus, or air-tube, bathed in matter, and the lungs were the seat of extensive disease, induced, beyond a doubt, by the results of this dangerous accident. In the other case, that at Edinburgh, the block lodged in the gullet, behind the windpipe, and caused a great deal of suffering, with hemorrhage. It was finally ejected during a fit of coughing, but bleeding to a considerable extent came on almost immediately, and the patient, a young man about twenty-two years old, died in a fainting fit.

There is one question of importance still unnoticed

with respect to the wearing artificial teeth. In consequence of advertisements constantly appearing in the daily papers, promising the adaptation of artificial teeth to the mouth without the previous removal of the stumps in the jaws, application is repeatedly made to the respectable dentist to effect the same, and, although he is well aware that the practice is not advisable on the score either of health or economy, his better judgment is not unfrequently overruled by the pertinacity of the applicant. It is considered that advantages may attend the non-removal of the stumps, especially if they be the remains of teeth in the front of the jaws, because the sockets continue distended to the utmost, and the natural form of the mouth is preserved, while all immediate necessity for their removal can be done away with by filing them to the level of the sockets, so that they shall not present any obstacle to the taking a model of the mouth. On the other hand, if they be allowed to remain in the jaws, they may become troublesome, and give rise to great irritation, excited by the pressure of the block upon them, especially during mastication; inflammation of the alveolar periosteum may be set up, besides which the socket gradually filling up, may and will project the fang before it, and thus induce mischief in the mouth, and render the block of artificial teeth inefficient and annoying, because it is no longer adapted to the altered form of the parts. To remedy this, if the blackened and dead fang be still retained, it must be again filed flush with the jaw-bone, and the plate itself must be re-fitted and re-adapted to the parts. Time

still passes away, and meanwhile the soekets continuing to fill and close up, still further project the fangs outward, and the same proeess must be repeated, thus entailing a repetition of expense and annoyane. Nor is this all ; for the alteration in the eondition of the fangs is always attended with a disgusting fetor, whieh neeessarily accompanys the deeomposition of animal matter, and after all, the fangs are either thrown out by the efforts of nature, or must be removed by the dentist, on aeeount of the annoyane and suffering caused by their presenee in the jaw-bones.

There can be no doubt, however, that artificial teeth can be and are adapted to the mouth without the prior extraction of the stumps of decayed teeth—a formidable operation eertainly, and one which the publie generally regard with greater terror than it merits. The foregoing statement, however, shows that it is not judieious to use false teeth until the stumps have been removed, for the inconveniences and loeal annoyance attending their non-extraction are far greater than any advantage that can be expeeted from their remaining, including even that of avoiding the pain that accompanies their extraction. They consist of dead matter, and although in some instances stumps may remain for years in the jaws without causing annoyance, if not interfered with, nevertheless if they be subjeeted to unwonted pressure, as must be the ease when artificiel teeth are worn, then irritation and inflammation may be induceed, and will not disappear until the offending cause has been got rid of. Nevertheless it is as well to say, that when patients are unwilling and determined not to have the

stumps extracted, artificial teeth can be adapted, and may be worn with a certain degree of comfort, if especial attention be paid to cleanliness.

Cleanliness, at all periods of life, is one of the principal means to be adopted for the preservation of the teeth, whether they be natural or artificial.

From the observations contained in the preceding pages, it will be evident that the diseases which involve the loss of the teeth, are chiefly dependent on constitutional defects or causes. The deficiencies in the formation of the organs of mastication, which are induced by an error in the constitution of the parent prior to the generation of the offspring, or which depend on hereditary predisposition, are not of course preventible or remediable by any measure that can be adopted, but much may be done even in such cases to arrest the spread of disease, and thus to render such teeth both serviceable and ornamental. How much more then may be effected for teeth, originally sound, strong and firm, to prevent the ravages of decay. Cleanliness alone is not sufficient. The causes of decay are both internal and external, and the remedies and preventives must also be applied both internally and externally.

The preservation of good, sound and useful teeth, if it be desired, as all apparently do desire, that they should be retained in efficient working order to old age, must be commenced in early childhood, and even in infancy. It is not enough to begin the cares of watchfulness when the teeth are above the gums, for it has been shown that protracted ill-health will influence and deteriorate those useful organs, while they are

still embedded within the jaw, and in the proeess of formation. This has been proved by the fissures or grooves whieh certain teeth present on their anterior surface, and which it has been demonstrated depend on the oecurrencee of serious infantile diseases, by whieh growth and nutrition are impeded in the teeth, as well as in the other parts of the human frame.

For a child to have good sound teeth, it is essential that its immediate parents should be in possession of that greatest of all earthly blessings, unimpaired health and strength—strength of frame and vigour of constitution—for it is evident that if the general condition of the infant's eonstitution be weakly and imperfeet, the teeth must partake of its defieieneies. Thus then will the foundations be laid. After birth, the greatest care and watchfulness are requisite to guard against the attaeks of disease, as their oecurrencee during the period of growth arrest its progress for a time, and interfere alike with all parts of the frame. Upon this subject medical men may dilate with greater propriety than I can ; the only part of their maladies to which I may professedly refer is that attending dentition, on which I have already dwelt somewhat largely. Nevertheless one more reason may be added why lanceing the gums should be had recourse to, early and steadily, and that is beeause, by removing the sourees of loeal and general irritation, it assists in preventing the ravages of disease upon a yet tender frame, and thereby aids in the endeavour to avoid the probability of the teeth being imperfeet, and more liable to decay.

Nothing perhaps is so common as the administration of doses of powerful medicines to children,

when labouring under ill-health, by mothers or nurses without the assistance of a medical man, and nothing scarcely can be so injurious. Were they to confine their practice of domestic medication to such simple matters as a dose of rhubarb, jalap, magnesia, or dill-water, there would be but little reason to find fault in the great majority of cases, although even with the use of such drugs injury may be inflicted, especially by the unwary loss of time in the incipient stages of dangerous diseases, which can only be recognised by medical practitioners. But those who make a point of studying "Hints to Mothers," books on the management of infancy, and domestic medicine, frequently do not hesitate to exhibit calomel, and other powerful mineral drugs, with which they effect an amount of mischief to the infant's constitution that the surgeon cannot always remedy. They also prepare work for the dentist, for the indiscriminate use of calomel in childhood greatly impairs the nutrition of the teeth, and induces a tendency to decay, which cannot always be checked. Mr. Graham, in the work cited in the "Introductory Remarks," says: "Calomel and other mineral medicines, and in fact all medicine which has a general effect on the system, is peculiarly injurious, and often destructive to the permanent teeth, when taken before those organs are completely formed." To show the bad influence of an ill-regulated diet, he adds: "Everything in the dietetic and other habits also, during this period, which is exciting and stimulating to the system, producing feverishness, or intensity of action, and which is calculated to hasten on the process of the second dentition, necessarily has an unhealthy

effect on the organic constitution of the teeth, and renders them more susceptible to the action of those causes by which they are diseased and destroyed."

To preserve the health of children generally, and of the teeth in particular, the diet should be wholesome, nutritious, plain, and unexciting.* It should be remembered that their food has to undergo the triturating process by the teeth, before it is carried into the stomach; and that these organs, still in process of growth, and largely supplied with nerves and nutrient blood-vessels, are thus brought into close and intimate contact with the substances devoted to the support of their frames, so that if they should contain any material likely to be noxious to them, they are in a position which renders them very liable to be so influenced. The other means for the preservation of the general health, as well as of the teeth, such as appropriate exercise, general cleanliness, &c., will be found fully detailed, and commented on in works on the diseases of children,

* Paul, of Egina, says: "Milk, when digested, is nutritive, but is injurious to the gums and teeth; and therefore, after taking it, one ought to rinse one's mouth, first with honeyed water, and then with an astringent wine." In another part of the work he says: "The teeth will not decay, if the following things be attended to. In the first place, to avoid indigestion, and frequent repetitions of emetics. Guard against such food as is hurtful to the teeth, as dried figs, honey boiled so as to become very hard, dates which are difficult to rub down, and all glutinous substances; likewise such things as are difficult to break, and may thereby loosen the teeth; in like manner also such substances as set the teeth on edge, and everything which is cold and putrid. The teeth also ought to be cleaned after supper."

and must not be more than alluded to here, as it would be trenching on the province of the medical man.

For the purposes of cleanliness in childhood, a piece of linen rag, or a brush with a piece of soft sponge fastened to it, instead of bristles, dipped in warm water, and passed over the teeth and gums, back and front, cleansing out the angles and irregularities after each meal, is sufficient. The strong, stiff bristles used by the adult might prove the source of irritation to the teeth of the young; nor are tooth-powders requisite at so tender an age, for if due care be used, tartar cannot collect in sufficient quantity, nor become sufficiently hardened to do injury. If, in spite of all precautions, decay commences in the first set, the diseased tooth, or teeth, should not be extracted, but the dentist should be consulted, and measures adopted, not only to prevent its further spread, but also to remedy the mischief already inflicted. If the teeth of the first set be removed in consequence of disease, before those that are permanent are ready to replace them, irregularities and deformity will be the result. The jaw-bones will not enlarge as they should do; the permanent teeth will be projected out of their position, and the little victim of ignorance will be what is called "under-hung," or some other annoying deformity will follow. For this reason, none but really qualified dentists—those, in fact, recommended by the family medical attendant—should be consulted, when the teeth of children require looking after.

Constitutional causes are operative at all periods of life in inducing the decay and destruction of different parts of the human frame. Those which we have solely

to deal with—the teeth—are influenced by many causes, or agents. The various disordered states or conditions of the mouth and stomach, whether arising from a defective state of the system, set up by bad health or irregularities, or by the factitious diseases induced by medicaments exhibited to remedy a state of constitution caused by excess, have, as already stated, according to one class or set of dentists, solely the power to induce decay of the teeth ; but by those who take all the deleterious influences into consideration, they are regarded as the principal, but not the sole causes of the loss of teeth. There cannot be a doubt but that a vitiated state of the secretions of the mouth, caused by a disordered stomach, by general bad health, or the exhibition of certain medicines, will induce decay. To prevent it, therefore, it is necessary, in addition to the local measures which it becomes the duty of the dentist to adopt, to subject the patient to certain rules of diet, and certain systems of medication, adapted to the peculiarities of each case. It is not possible, neither would it be right, to lay down rules for the diet, &c., and medicinal management of every case in which there is a tendency to caries of the teeth ; because, in the first place, mistakes might be made by non-professional persons appropriating that plan of treatment to their own cases, which was intended solely to guide those of an opposite, or at least of a different temperament of body, inasmuch as those who have not had the benefit of a medical education, are unable to distinguish the varying shades of the characters of predispositions and of diseases ; and, secondly, because in so doing, the privileges of the members of the medical profession would be interfered with,

not to their detriment, but to the ultimate real injury of the public.

General rules, therefore, as regards diet only—for directions respecting the exhibition of medicines are beyond the dentist's province—can alone be laid down; but it is to be hoped that a careful attention to these will assist in preventing the spread of decay in teeth.

It has become almost a trite saying, to refer the majority of the diseases to which the human frame is subject to the excesses introduced by civilisation, more especially with regard to the teeth, and how thorough is the axiom. In our own especial branch, they compose the principal constitutional cause, excepting hereditary tendency, for dental caries. Errors in diet, repeated from time to time, but far more frequently of daily occurrence, disorder the stomach and bowels, impede and alter the healthy secretion of the bile, and acting by sympathy, vitiate and render acid the fluids which are poured into the mouth by the glands which are destined by nature to furnish it with its requisite secretions. The injuries which are caused in the system by errors in diet, whether of excess in quantity or quality of the food taken, or of its nature and temperature, are not confined to the general disturbance of the health, which every gourmand or gourmet has experienced, but also extend to the production of local disease within the mouth; and it has already been shown that a vitiated state of the secretions of the mouth has a powerful influence in inducing caries of the teeth, and also of the deposit of tartar upon them, with all its bad consequences.

A simple, plain, and wholesome diet, is at all times one of the best preservatives, not only of the teeth, but of the general health. The vitality of the teeth is below that ordinarily possessed by other parts of the human frame, except perhaps earilages and tendons, but they are proteeted by dense and powerful coats of armour, in which, however, it frequently happens that there is a flaw; a joint or rivet may be imperfect, and through that the death-wound may be inflicted. To quit metaphor, teeth will not bear any great variations of temperature with impunity. It has been said indeed, that "almost all artifcial preparations of food, and espeially those connected with the use of fire, are necessarily more or less injurious to the teeth, and cause them to become diseased, and painful."* This statement is supported by the fact that animals, in a state of nature, rarely if ever suffer from diseases of the teeth; nor even those which have been domesticated, unless their diet be such as to be unfit for their maintenance in a state of health. Cows, according to Mr. Burdell, a surgeon-dentist, at New York, when fed on warm "still slops" have their teeth very much incrusted with tartar, and in many instances the enamel is destroyed. A milkman in extensive business once tried this experiment on a large seale, but he found after a time that it was a sure means for the destruction of the teeth, and he was obliged to change their diet; and give them grass and hay, fattening as well as he could those whose teeth were destroyed, and then to kill

* Graham, opus cit.

them off. It was a cruel experiment, but human beings may derive benefit from the lesson it teaches.

Graham (*opus citatum*) states that "A very intelligent sea-captain, who has visited most parts of the globe, informed him that he has observed with surprise the different conditions of the teeth of the different nations and tribes he has visited; and that he has always found that where the people use much hot drink and hot food, and smoke tobacco or other narcotic substances, their teeth are black, and much decayed; and that in the islands of the Pacific, and other parts, where the people seldom or never take anything hot into their mouths, use little or no animal food, and are very simple, plain, and natural in their diet, he found that their teeth were very regular, white, clean, and free from decay. 'The contrast,' he said, 'between the black, decayed teeth of the inhabitants on the western coast of South America, and the white, clean, healthy teeth of the inhabitants of some of the islands in the Pacific of nearly the same latitudes, was so great and so striking as to excite my astonishment.'

"A medical gentleman, who formerly spent fifteen years in one of the remote counties of Maine (U.S.), where the principal business carried on was the getting out lumber, and where the inhabitants with active, industrious habits, knew nothing of luxury, but subsisted on a plain, simple, and coarse diet, stated that the people were very remarkable for their fine, white, and regular teeth, which were wholly free from decay; and that, although he was the only physician in the whole county, he had occasion to extract but one tooth in the fifteen years; and he finally left there, because

he could find no professional business to attend to. The same freedom from decay of the teeth is found in all portions of the human family, in the same simple and temperate circumstances and habits. The peasantry of Ireland, and other parts of Europe generally, who are free from the use of intoxicating substances, and whose dietary habits are simple and plain, are remarkable for their fine, healthy, and regular teeth."

But why need we multiply facts? It must be self-evident that indulgence in the pleasures of the table disorders the stomach, and renders it liable to disease; and that when that organ is out of health, the secretions of the mouth participate, and impair the strength and vitality of the teeth. A simple, well-regulated diet, with the other requisites for the preservation of the general health, laid down by authors on the physiology of the human frame, will preserve the teeth even to old age. Smoking tobacco has been referred to, in one of the preceding passages, as a cause of decay of the teeth, but this only happens when its use is carried to excess, and the habit of cleanliness, especially in the removal of tartar, is neglected.

The causes leading to the deposit of the tartar upon the teeth have been already alluded to. Those which are constitutional must be combated by appropriate remedies, directed to improve the tone and strength of the system; those which depend on a local origin must be met by local applications, which again may be useful in remedying the effects of constitutional causes, although they cannot cure or prevent the disease as long as the systemic cause continues unheeded. The

nature of tartar has also been spoken of. It consists chiefly of animal and vegetable parasites, infesting the teeth, tongue, and gums. The local measures, having cleanliness for their base, are very simple. A tooth-brush, possessing a moderate degree of hardness, dipped in water, if passed with some little vigour over the teeth, and into every angle and irregularity, after every meal, will in general be sufficient to remove every deposit on the teeth, and such remains of food as might otherwise become inconvenient and injurious. When there is a deposit of tartar, and it has become at all hardened, it is serviceable to use the purest white soap, at least once daily. It has the effect of destroying the vitality of the animalcules, and of cleansing and purifying the teeth. In using the tooth-brush, the friction ought never to be so rough as to cause the gums to bleed. Occasionally a tooth-powder, or paste, may be employed, such as charcoal, prepared chalk, or a mixture of both, or any other inert powder. Some surgeon-dentists add a little chloride of soda to correct the fetor of the breath, but this salt should be employed with great caution. Acids are specially injurious, by destroying the enamel, softening the substance of the teeth, and by causing or rapidly advancing the progress of decay. They impart to the teeth a beautiful white appearance at first, but their ultimate effects are most injurious. So also are metal tooth-picks, pins and needles, which are sometimes used to remove portions of decomposing food from between the teeth, or out of decaying cavities in them. If a tooth-pick is to be employed, it should be made from a quill. Such are the least injurious.

Some few years since, a controversy was carried on in the pages of the "Laneet," relative to the alleged injurious action of camphor on the teeth, in the form of camphorated powder, or paste. Mr. Tearne published a letter in that journal for September 19, 1846, in which he says he had met with very many cases of unnatural brittleness of those organs, and had invariably found that the tooth-powder used was *camphorated chalk*, in which, however, the quantity of camphor contained is always very small, as compared to the proportion of chalk used. He was in consequence led to make some experiments, to ascertain the nature of the action of camphor upon teeth. He allowed them to remain in chalk, impregnated with this substance, for a few days, after which he found that the enamel was appreciably altered. The same result followed the placing teeth in camphorated spirit, the enamel becoming more brittle, and more readily removed by an instrument; in fact, he said it appeared to be rendered somewhat lighter and porous. Finally, the exposure of teeth to the vapour of camphor excited the morbid action to a still greater extent. He, therefore, cautioned the public strongly against the use of all dentifrices in which camphor forms an ingredient. Another letter was soon after published by Mr. Hunt, of Yeovil, Somersetshire, in which he confirmed all the statements made by Mr. Tearne; and adds that he had also noticed that when a solution of camphor was used to alleviate pain in decayed teeth, it rendered them very brittle, thus increasing the difficulties of the subsequent extraction.

The statements thus made attracted considerable attention, and also excited some degree of alarm in the

minds of those who have been previously using eamphorated preparations for the cleansing and beautifying their teeth. It was consequently deemed neecessary that further inquiries should be made, and investigations instituted, with the view to aseertain what amount of reliance could be placed on the statements of these gentlenien. Mr. Herapath, of Bristol, a distinguished and talented ehemist of European fame, and Dr. Reid, of Edinburgh, commeneed a series of experiments, the results of whieh totally invalidated the eonelusions drawn by Messrs. Tearne and Hunt ; while, at the same time, several other correspondents of the "Lancet" entered the arena of disputation, and deelared their belief that eamphor acted injuriously on the teeth, impaired their efficieney, and rendered them more liable to deeay. One of these, Mr. Davies, of Heytesbury, detailed his own personal experienee. He stated that at a time when every tooth in his head was perfectly sound and free from disease, as his dentist assured him, he began to use the camphorated dentifreee ; and, after the lapse of some time, he was annoyed at finding every now and then pieees of enamel breaking off from his second molar tooth, on either side of the upper jaw. The brittleness soon extended to the *dentes sapientiae*, and at the time of writing his letter, he had seareely any portion of these teeth remaining. He also suffered greatly from toothache, whieh eeased altogether on omitting to use the eamphorated dentifreee, after whieh also the deeay did not extend.

The experiments of Dr. Reid were made on four bicuspidati, and were continued for a much longer period than those made by Mr. Tearne, and were more

satisfactory, because he called the microscope into use, which Mr. Tearne had omitted to do. Dr. Reid split each tooth longitudinally, and numbered each half, laying one of each aside to compare with that experimented on; of the remaining halves he placed one in dry camphorated chalk, another in the same preparation moistened with water, a third in camphorated spirit, and the fourth in camphorated water. After the lapse of thirty-five days, he removed them, and joining the halves of each tooth, subjected them to microscopic scrutiny. In none of the portions that had been experimented on, did he find the least apparent alteration of structure; the surfaces of the bone and enamel bore no trace of erosion, and the split edges of each half appeared as sharp as those of its fellow. Dr. Reid added: "Enough has already been said to show that the use of camphor in dentifrices, or lotions, has nothing to do with the appearance noted." * * * "The unusual fragility of decayed teeth, where camphorated spirit has been applied, may be accounted for in this way; namely, that individuals suffering from severe toothache are apt to fly from one remedy to another, and thus to camphorated spirit may have been ascribed the mischievous effects of creosote, when, as is frequently the case, it contains a large portion of acid!" He says further, that the appearances noted by Mr. Hunt, and others, have been met with by him on the teeth of those who use camphor in neither one shape nor another. Mr. Herapath's experiments led him to a similar conclusion.

The bad effects of camphor on the teeth have been undoubtedly greatly exaggerated, but the experiments

instituted on both sides of the question are invalid, and not entitled to the utmost respect, inasmuch as they were performed on dead teeth—on teeth deprived of the resisting power of vitality, whereas the dentifrices and lotions containing camphor are applied to living teeth by means of friction, are used for a comparatively short space of time, and the mouth, teeth, and gums are carefully cleansed and washed out, after their use, by every one who desires to keep those valuable organs in good condition, and their breath sweet. If camphor, when used for the purpose of cleansing the teeth, were so deleterious to them in every instance, as Messrs. Tearne, Hunt, Davies, and others, seek to imply, considering how extensively and how freely it has been used for very many years antecedently, it would assuredly have been discovered before the year 1846. It is not at all improbable, however, that there may be a certain condition of predisposition, a certain tendency to disease in the teeth of some individuals, that may render that application decidedly baneful to them, which would be innocuous in the hands of the great majority of the population. It is at all events clear from the experiments made by Dr. Reid and Mr. Herapath, which are at least of equal value with those of Mr. Tearne, that some teeth are not affected by the alleged noxious agency of camphor; and it may fairly be assumed that, as many thousands are in the habit of using camphorated preparations for the teeth daily, and do not complain, it is not in a general way really injurious to them. It may, however, be remarked, that as dentifrices have been prepared which do not contain

camphor, and are at the same time as serviceable as those which do, those persons whose teeth have a tendency to brittleness, or who are at all alarmed on the subject, may avoid the use of camphorated preparations by employing other tooth-powders.

As an apt conclusion to this work, it has been deemed advisable to throw together in the form of an Appendix, some of the most approved recipes for tooth-powders, dentifrices, lotions for the mouth, remedies for the toothache, loosened teeth, spongy and ulcered gums, ptyalism, &c. It should, however, be understood that the author does not pledge himself as to their respective value, as one tooth-powder, or lotion, may suit one case, and be totally unfit for the next for which it is tried.

APPENDIX OF PRESCRIPTIONS.*

TOOTH-POWDERS.

Take of Orris-root, powdered . . .	15	oz.
Cuttle-fish , , . . .	2	„
Cream of tartar . . .	1	„
Essential oil of cloves . . .	20	drops.

Mix carefully together.

* The following dentifrices are recommended by Paul of Egina. They are somewhat singular, and of course are antiquated. We do not vouch for their value. “The burnt roots of birthwort, burnt hartshorn and some mastie. *Another:* White salts mixed with honey, and wrapped in the leaves of the fig-tree, and burnt until reduced to ashes. *Others:* Buccinæ filled with salt and burnt; land snails burnt with honey, unwashed wool burnt with a little salts. With each of these, for the sake of fragrance, let there be mixed the schoenanth or spikenard, Indian leaf, (*Malabathrum*), or cyperus, or iris.” He gives the following for another dentifrice, and also recommends it for gum-boil: “Of that kind of alum

When the secretions of the mouth are much vitiated, and have become acid, it would be better to substitute prepared chalk for the cream of tartar.

Take of Orris-root, finely powdered	2	oz.
Cuttle-fish , ,	3	„
Prepared chalk , ,	4	„
Musk	2	grains.
Essence of cloves	2	drops.
Rose pink, sufficient to impart a color.		

Mix carefully together, and strain through a fine sieve.

This will form a better tooth-powder than the preceding, as it does not contain any acid.

ealled plinthitis, 4 oz. ; of sal ammoniac, 4 oz. ; of myrrh, of costus, of pellitory, of each 4 drachms ; of pepper 80 grains.”

“ *For loose teeth, running gums, and for every spreading ulcer in the mouth.*—Of burnt ehaleitis, 12 drachms ; of ealamine 8 drachms ; use in powder with vinegar.”

But the most singular and amusing of all reecipes given by this old author, or rather compiler, is the following :

“ *How to remove the teeth without pain.*—Apply flour with the juice of spurge, and above it an ivy-leaf, and leave it for an hour. They will spontaneously break in pieecs.”

Dentistry has certainly greatly improved since the days of Paul ; and the disocovery of the action of ehloroform enables us now to remove the teeth without pain and without breaking, but not without danger.

Rhazes recommends the following dentifricee : “ Of hartshorn, of the seeds of tamarisk, of eyperus, of spikenard, each 1 oz. ; of the salt of gem 2 draehms ; to be pulverised, and the teeth rubbed with it.”

RUSPINI'S TOOTH-POWDER.

Take of Orris-root, powdered	4	oz.
Armenian bole	2	„
Crabs' eyes, powdered	1	„
Pimento powder	1	„
Rose pink	1	„

Mix together with great care.

Take of Rose pink	5	oz.
Armenian bole	2	„
Cuttle-fish, powdered	2	„
Cream of tartar	2	„
Myrrh, powdered	1	„
Orris-root	$\frac{1}{2}$	„
Essence of bergamotte	15	drops.

Mix.

Take of Prepared chalk	3	drachms.
Spanish soap	1	„
Orris-root, powdered	2	„
Bicarbonate of soda	1	„

Mix well together.

[SNELL.]

Take of Prepared chalk	2	oz.
Cuttle-fish	1	„
Orris-root	1	„
Powdered myrrh	$\frac{1}{2}$	„

o 2

Quinine 10 grs.

Drop-lake sufficient to color it.

Mix carefully together, adding any of the essential oils
as a perfume. [SAUNDERS.]

Take of Precipitated chalk . . . 1 oz.

Powdered camphor . . . 2 drachms.

Mix: this should be kept in a bottle.

Take of Prepared chalk 4 oz.

Powdered orris-root 4 ,,

,, cinnamon. . . . $\frac{1}{2}$,,

Bicarbonate of soda $\frac{1}{2}$ drachm.

White sugar 1 oz.

Essential oil of lemons 15 drops.

,, roses 2 ,,

[CHAPIN HARRIS.]

Take of Prepared chalk 2 oz.

Powdered orris-root 2 ,,

Prepared pumice-stone 1 ,,

Mix.

[CH. HARRIS.]

The pumice-stone can only act mechanically, and unless it be ground very fine, or, better still, be levigated, it may injure the enamel.

Take of Orris-root	1 oz.
Gum myrrh, powdered,	1 ,,
Nutmeg, finely powdered	4 scruples.
Prepared chalk	4 oz.

Mix carefully. [ROBINSON.]

Take of Charcoal, finely powdered	2 oz.
Bark, in powder	4 ,,
Sugar ,,,	1 ,,

Mix.

Take of Powdered Castile soap	} of each	2 oz.
Orris-root		
Cuttle-fish	} of each	3 ,,
Prepared chalk		
Oil of cloves	} of each	20 drops.
Essence of lemons		

Mix.

Take of Powdered cuttle-fish	} of each	1 lb.
Prepared chalk		
Powdered orris-root	} of each	$\frac{1}{2}$,,
dragon's blood		
Oil of cloves	} of each	1 drachm.
Essence of lemons		
Carmine or lake, sufficient to color it.		

Mix.

Take of Cream of tartar	2 oz.
Alum	1 drachm.

Powdered eoehineal	2	scruples.
Essence of roses	$\frac{1}{2}$	draehm.

Mix.

This is essentially an acid preparation, and will whiten the teeth ; but in using it at all freely, great risk will be incurred of future injury to the enamel and substance of the teeth. If it be employed, it should be with the greatest eaution, in very small quantities, and at rare intervals.

Take of Powdered talc, or French chalk 2 oz.

Bicarbonate of soda . . . $\frac{1}{2}$,

Essence of roses . . . $\frac{1}{2}$ draehm.

Mix.

Take of Cream of tartar 2 oz.

Powdered orris-root 1 ,

 ,, myrrh $\frac{1}{2}$,

Dragon's blood $\frac{1}{2}$,

Mix.

Take of Powdered bark 1 oz.

 ,, Myrrh } of each $\frac{1}{2}$,

 ,, Rhatany-root }

 ,, Orris-root }

Mix.

Take of Powdered eharcoal 2 oz.

 ,, Bark } of each $\frac{1}{2}$,

 ,, Myrrh }

Mix.

Take of Powdered myrrh

„	bark	}	of each equal parts.
„	orris-root		
„	cuttle-fish		
„	Armenian bole		
„	Dragon'sblood		

Mix.

Take of Orris-root, powdered . . . 1 oz.

Prepared chalk 2 „

Cuttle-fish, or levigated pumice 4 „

Mix : recommended by Saunders as an excellent tooth-powder, for the preservation of artificial teeth. The block is to be removed from the mouth, and a small quantity of the powder to be rubbed on it with a hard brush.

DENTIFRICE ELECTUARY.

Take of Red coral, finely powdered . . . 4 oz.

Cuttle-fish „ . . . 1 „

Bitartrate of potash } (Cream of tartar) } . . . 2 „

Cochineal 1 „

Alum 1 drachm.

Fine honey 10 oz.

Rub the cochineal and alum together, and set them aside for the purpling of the mixture ; then mix the honey and the other drugs with them, and aromatise

with some essential oil. This electuary assists in preserving the whiteness of the teeth. A less quantity of cream of tartar would however be advisable, or it may be omitted altogether, as the acid it contains may ultimately affect the enamel. The proportion of alum is too small to do any injury. Its principal action seems to be confined to bringing out the purple color of the cochineal.

[FRENCH PHARMACOPEIA.]

Take of Precipitated chalk 1 oz.
 Powdered myrrh }
 „ rhatany-root } of each 2 drachms.
 „ orris-root 1 drachm.
 Honey of roses, enough to form a paste.

Mix well together.

Take of Cream of tartar 1 oz.
 Powdered orris-root } of each $\frac{1}{2}$ „
 „ red roses }
 Oil of cloves 10 drops.
 Honey of roses, enough to form a paste.

Mix together.

RUSPINI'S TINCTURE FOR THE GUMS.

Take of Rectified spirit of wine 1 pint.
 Essence of scurvy grass $\frac{1}{2}$ „
 Distilled water $\frac{1}{2}$ „

Powdered orris-root	1 oz.
Cloves	
Ambergris } of each	$\frac{1}{2}$,,
Alum	
Sage	$1\frac{1}{4}$,,

Digest together in a glass bottle for ten days, shaking the contents occasionally, and then filter through blotting-paper.

Take of Orris-root	8 oz.
Cloves	1 ,,
Rectified spirit	2 pints.
Essence of ambergris	1 oz.

Digest for ten days, and filter as above.

GREENHOUGH'S TINCTURE FOR THE GUMS.

Take of Bitter almonds	$\frac{1}{2}$ lb.
Rectified spirit	$\frac{1}{2}$ pint.
Boiling distilled water	2 pints.
Essence of scurvy grass	4 oz.
Brazil wood	$1\frac{1}{2}$,,
Cochineal	$\frac{1}{4}$,,
Cloves } of each	$\frac{1}{8}$,,
Pimento	

Let them simmer together for twenty minutes, and then strain through muslin.

ASTRINGENT LOTION FOR THE GUMS.

Take of Tincture of rhatany . . .	2 oz.
Alum	$\frac{1}{2}$ drachm.
Tincture of pellitory	$\frac{1}{2}$ oz.
Eau de Cologne	2 ,,

Mix: add a teaspoonful of this lotion to half a tumbler of water, and brush the teeth and gums with it two or three times a day. Recommended to be used during and after the removal of large deposits of tartar, the gums being diseased, and the teeth loose.

[ROBINSON.]

Take of Alum	$1\frac{1}{2}$ drachm.
Tincture of myrrh	3 ,,
Camphor julep	$5\frac{1}{2}$ oz.

Mix. [BELL.]

Take of Port wine	2 oz.
Camphor julep	2 ,,

Mix. [BELL.]

ODONTIC BALSAM.

Take of Bruised cloves	} of each .	1 oz.
," nutmegs		,
," cinnamon	} of each .	$1\frac{1}{2}$,,
Balsam of Peru		
Liquid laudanum	} of each .	1 drachm.
Alcohol		1 pint.

Digest together for a week, then add of

Sulphuric ether	$1\frac{1}{2}$	oz.
Essence of amber	12	drops.

[DESFORGES.]

Take of Tincture of bark }
 Spirit of horse-radish } of each . 2 oz.

Mix.

ODONTIC ELIXIR.

Take of Bruised bark	3	oz.
„ guaiacum	5	„
Bruised pellitory of Spain . .	3	„
„ cloves	5	drachms.
Orange-peel	$\frac{1}{2}$	drachm.
Benzoin	2	„

Macerate for a week in four pints of spirits of wine, and then filter. A teaspoonful, added to a glass of water, to be used in washing the mouth. It strengthens and preserves the gums by its tonic and astringent qualities.

[DESFORGES].

ODONTALGIC MIXTURE: FOR THE RELIEF OF TOOTHACHE.

Take of Essential oil of cloves	8	drops.
Tincture of opium	1	drachm.
Sulphuric ether	3	drachms.

Mix, and shake it well each time it is used. A small piece of wool, wetted with it, to be passed into the cavity in the decayed tooth.

TOOTHACHE TINCTURE.*

Take of Tannin	1	scruple.
Mastic	5	grains.
Ether	2	drachms.

Mix.

To be applied, on cotton wool, to the previously dried cavity in the tooth.

EMBROCATION FOR TOOTHACHE.

Take of Spirit of camphor	1	oz.
Laudanum	3	drachms.

Mix.

Take of Spirit of rosemary	} of each	1	oz.
Camphorated spirit			
Muriate of morphia		3	grains.

Dissolve. To be rubbed freely on the cheek, angle of the jaw and neighbouring parts.

* Gray's Supplement to the Pharmacopeia, by Redwood.

DROPS FOR TOOTHACHE.

Take of Sulphuric ether	1 oz.
Creosote	$\frac{1}{2}$ drachm.
Extract of gall-nuts	1 , ,
Gum camphor	1 oz.

Dissolve. A piece of lint, wetted with the solution, to be introduced into the cavity.

[CH. HARRIS.]

Take of Sulphuric ether	1 oz.
Powdered camphor ,, alum	2 drachms. } of each

Dissolve, and use, as for the previous prescription.

ASTRINGENT LOTION FOR SPONGINESS OF THE
GUMS.

Take of Nutgalls, powdered	2 drachms.
Orris-root, „	1 drachm.
Cinchona bark	2 , ,
Infusion of roses	4 oz.

Mix. To be used several times a-day.

ASTRINGENT LOTION FOR ULCERATION OF THE
GUMS.

Take of Biborate of soda (borax)	2 scruples.
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Decoction of sage	6	oz.
Honey	1	„

Dissolve, and use as above.

KOECKER'S LOTION FOR SPONGY AND ULCERATED GUMS.

Take of Clarified honey	3	oz.
Vinegar	1	„

Three tablespoonfuls of this, added to a pint of warm sage-tea or water, form a lotion, which may be used frequently during the day.

Take of Clarified honey	}	of each	2	oz.
Tincture of bark					

Dilute as above, and use in the same manner. The tincture of bark may be replaced by the tincture of myrrh, rhatany, or catechu.

ASTRINGENT LOTION FOR THE SAME.

Take of Tannin	6	grains.
Tincture of rhatany	}	of each
„ „ myrrh		
Rose water	4	oz.

Dissolve, and use frequently during the day.

Take of Tannin	1 scruple.
Distilled water	4 oz.

Dissolve, wash the gums with the lotion frequently during the day.

LOTION IN MERCURIAL SALIVATION.

Take of Ioduret of potassium	1 scruple.
Distilled water	4 oz.
Rose water	2 ,,

Dissolve, and add of

Tincture of iodine	10 drops.
Simple syrup	1 oz.

Mix.

THE END.

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